THE CITY OF PLEASANTON

Special Meeting of the COMMITTEE ON ENERGY AND THE ENVIRONMENT AGENDA

August 5, 2020 – 5:00 P.M.

On March 3, 2020 Governor Newsom proclaimed a State of Emergency due to COVID-19 and subsequently issued Executive Orders N-25-20, N-29-20, and N-33-20, suspending provisions of the Brown Act allowing meetings via teleconferencing and members of the public to observe and offer comments telephonically or electronically.

You may join and view this meeting. https://cityofpleasanton.zoom.us/j/91456771098

If you wish to speak on an item listed on this agenda, please complete and submit a speaker card here or at https://forms.cityofpleasantonca.gov/f/EnergyandEnvSpeakerCard by 5:00 p.m. the day of the meeting, August 5, 2020.

CALL TO ORDER

ROLL CALL

AGENDA AMENDMENTS

CONSENT CALENDAR

1. Approve regular meeting minutes of January 22, 2020

MEETING OPEN TO THE PUBLIC

2. Presentations

3. Public comment from members of the audience regarding items not listed on the agenda.

OTHER MATTERS BEFORE THE COMMITTEE

4. Climate Action Plan Update

MATTERS INITIATED BY COMMITTEE MEMBERS: Brief reports on conferences, seminars, and meetings attended by Committee members.

ADJOURNMENT

Next Special Meeting of the Energy and the Environment Committee will be held via zoom on September 2, 2020 at 5:00 p.m.

Accessible Public Meetings

The City of Pleasanton can provide special assistance for persons with disabilities to participate in public meetings. To make a request for a disability-related modification or accommodation (e.g., an assistive listening device), please contact the City Clerk's Office at 123 Main Street, Pleasanton, CA 94566 or (925) 931-5027 at the earliest possible time. If you need sign language assistance, please provide at least two working days' notice prior to the meeting date.

MINUTES
CITY OF PLEASANTON
COMMITTEE ON ENERGY AND THE ENVIRONMENT
January 22, 2020

CALL TO ORDER
The regular meeting of the Committee on Energy and the Environment was called to order at 6:30 p.m.

ROLL CALL

Present: Catherine Brown, Eric Cartwright, Terry Chang, Bruce Daggy, Robert Gan, and Laurene Green

Absent: Joel Liu

AGENDA AMENDMENTS

None.

CONSENT CALENDAR

1. Approve the regular meeting minutes of November 18, 2019, with the following changes:
   1) On page 3, paragraph 5, change January, 2020 to February/March, 2020;
   2) On page 4, paragraph 6, change the word far to large;

   Motion by: *Green* ***Seconded by:*** *Chang*
   Ayes: Brown, Cartwright, Chang, Daggy, Gan and Green
   Absent: Liu

MEETING OPEN TO THE PUBLIC

2. Introductions / Presentations:

Ms. Hopkins reported that the Committee on Energy and the Environment staff liaison has changed from Operations to the City Manager's office and she will be the new staff liaison. She requested that all communication for the committee go through her and if others need to be pulled in (i.e. Mr. Reda, Ms. Campbell, Ms. Yurchak, etc.), she will do so to ensure she stays abreast of committee member requests and that issues are addressed in a timely manner.

Staff and the committee members introduced themselves and provided an overview of their backgrounds and how it relates to their interest in the committee.

Ms. Hopkins indicated that the committee was formed in 2008 and is comprised of seven residents appointed by the mayor for a two year term. The committee has been renewed over the years and has been extended to September, 2021. The committee is a temporary structure that the city uses to serve as advisory role to the Council on Energy and Environment priorities, program development and as requested includes development of measurable strategies, assisting with outreach events and providing input on those programs and ordinances, etc. The committee will have the opportunity to inform the Council what they'd like to work on through the Council's Priority Setting Process and occasionally the City Council will make a request of a committee to study something on a special project. Ms. Hopkins reviewed the council priorities that the committee has been tasked with. It was noted that some of the priorities listed may not have originated with the committee, but there may be some overlap with other commissions in which the committee would be tasked with providing input.

also said she would be adding the agenda and meeting minutes, so they are all in one place for reference. Ms. Campbell encouraged the committee members to also inform others about the website and to have them sign up for notifications.

Mr. Reda suggested also having online surveys, so that individuals could provide input if they aren't able to attend events.

Ms. Hopkins indicated that staff will be looking into various way to engage the public on this topic (surveys, mailers with utility bills, etc.).

Mr. Gan reported that he would like to get the word out to the students at Foothill High School. Staff suggested he provide a link to the website and encourage students to sign up and when surveys are available, they will be automatically notified.

Ms. Hopkins said that one of the keys groups to be targeted in the community outreach is youth and that the City currently works very closely with the Go Green Initiative group on the Mandatory Recycling Ordinance (MRO) and also sponsors the 21st Century Leadership Group at both Amador and Foothill high schools with over 125 students that are involved in energy, environment, waste reduction, and sustainability. The City will be doing special outreach to groups such as these to obtain input. Staff welcomed Mr. Gan's assistance in outreach to students at Foothill.

Ms. Chang explained there was an outreach opportunity on Friday, January 24, at the Film Festival where over 500 guests are expected. She indicated she could print out the URL scan code and provide as a marketing tool to promote the CAP 2.0 website at the event.

Ms. Hopkins indicated that marketing efforts are in the beginning stages, but staff will eventually have a variety of marketing materials available for distribution (i.e. business cards with the URL code and hashtag, posters, etc.)

Ms. Hopkins said the City will be hosting an Earth Day Event on April 18, 2020, at the Pleasanton Library, and staff will be there to promote the CAP 2.0. She will forward a flyer when it is available.

Ms. Hopkins reported that staff would return to the committee in March with updates on the community outreach plan and obtain any necessary feedback.

Mr. Cartwright questioned if the plan could potentially develop some recommendations for actions that would prompt amendments to the City's General Plan to adopt those policies. Ms. Campbell indicated that it is still yet to be determined. She said it's likely that there will be some changes to the Municipal Code, however, if there is something that's a big red flag that would warrant changes to the General Plan, staff would amend it as necessary. Ms. Hopkins indicated that the sunset date for the general plan is 2025, so if there's something minor to be updated it could be changed at that time.

There was some discussion regarding the types of materials to be added to the resources page. It was determined that anything city or regional related could be added, however, if there are other studies or articles that would be helpful, the committee can forward to Ms. Hopkins and she would add to an internal folder for reference if needed. Ms. Campbell indicated the consultant team has worked on various CAPs and should have a pulse on the various reference materials that should be referenced but it always helps to have additional resources.

Mr. Daggy requested that Ms. Campbell send out the link to the December 17, City Council discussion and scope of work. Ms. Campbell indicated she would do so.

environmental justice, public health). The CAC representative to the Board can participate at Board meetings but cannot vote.

Local Development Business Plan (LDBP)
The LDBP is a comprehensive framework for accelerating the development of clean energy assets within Alameda County. Currently, most LDBP initiatives are in the development stage, and staff expects new jurisdictions to be eligible to participate in 2021 when the service begins. City staff will monitor LDBP initiatives closely and make recommendations when necessary.

Mr. Reda indicated he would send out additional information on the projects that they are working on as they become available.

Communication Plan
EBCE will send out four notices by mail to residents and business owners during the 2021 rollout. Two will arrive in the two months before the automatic enrollment date and two will arrive within two months after service commencement. These letters give background information, explain EBCE's partnership with PG&E, describe the different energy service tiers, and offer the option to opt out. Additionally, EBCE offer to table at public events and speak with the Chamber of Commerce and any other groups or organizations that we recommend they connect with.

City staff developed an EBCE communication plan to begin in January 2020 through December 2021. This communication plan will bolster the efforts of EBCE. Information will be disseminated through a variety of means such as: a Pleasanton EBCE webpage, the Progress Newsletter, City Manager E-Newsletter, social platforms, local media and community organizations.

Three Electricity Service Options
Mr. Reda reviewed the three electricity options available outlining the energy mix, cost vs. PG&E, and outlining which EBCE cities have opted in. He indicated that the Go Green Initiative gave a presentation on the greenhouse gas (GHG) emissions form municipals buildings in Pleasanton in October 2019. Eliminating the GHG emissions associated with electricity can be a first step towards achieving the Climate Action Plan 2.0 goals and demonstrating to the public the City endorses EBCE.

There is no date that the City must opt up by. Opting up in the winter of 2020 can be a useful marketing tool as residents and business owners for the first time, are empowered to make a choice about their own electricity procurement. Mr. Reda indicated that the options will be discussed with City Council over the next year. Should the City decide to opt up to Renewable 100 it would cost the City approximately $95,000 more per year.

Mr. Cartwright inquired if the committee would be asked their recommendation on which program to enroll in.

Ms. Hopkins said she would have to get direction from the City Manager if this is something that the committee would be asked to provide a recommendation.

Ms. Brown requested copies of the slides. Ms. Hopkins indicated that staff would forward all the presentations to the committee members.

Mr. Daggy inquired if there is a more generous payback for roof top solar.

Mr. Reda indicated that he hadn't looked into that and made a note to do some additional research.

and processing. Many of these items still end up as litter, or are not successfully processed as recycling or compost, and end up in the landfill.

Building up reusables infrastructure
Reusables have the potential to significantly reduce consumption of single-use food ware, but local infrastructure for reusable is not well developed in Alameda County. Significant investment is needed to support the growth of services and solutions that facilitate the use of reusables for takeout dining, such as dishwashing services, cup and container rental services, reusable dining ware designed for takeout, etc.

Burden on businesses and consumers
Outreach and education to food vendors is needed to address health code related concerns about reusables, and to ensure equity and accessibility to less-abled customers, lower-income individuals, and transient populations just passing through and not likely to have reusable food service ware readily available.

In May of 2019, StopWaste staff gave a presentation to the Program and Administration (P&A) Committee and the Recycling Board to provide some background for a single-use disposable food ware ordinance. The presentation highlighted some of the challenges with different food service ware options including toxicity and composting difficulties. StopWaste staff returned to the P&A Committee and the Recycling Board on November 14 to present single-use disposable ordinance options and request feedback. The options included developing a model ordinance for adoption by individual member agencies or a single countywide ordinance coordinated through StopWaste.

StopWaste proposed a basic ordinance which includes the following elements:
1. Reusable food service ware required for all dine-in establishments
2. Single-use food ware (plates, cups, bowls) and accessories (straws, utensils, condiment cups) must be BPI certified compostable fiber (non-plastic)
3. Single-use accessories (straws, utensils, condiment cups) available only on demand/self-services

A more comprehensive ordinance could include the above elements as well as the following:
1. $0.25 charge on single-use cups
2. $0.25-0.50 charge per meal for to-go food service ware if requested

The ordinance can be developed as a model, ready for customization and adoption directly by member agencies, or implemented countywide. Rolling out the ordinance in distinct phases that add more complex elements over time would allow time for affected parties to prepare for the changes and address operational considerations. Additionally, a phased approach can gradually expand the affect audience – starting with municipal operations and expanding over time to include special events, food vendors, and third-party delivery services. If implemented countywide, the organization could affect up to 6,000 establishments, including restaurants, food trucks, catering businesses, prepared food vendors, and food provided via third party delivery.

If consensus amount jurisdictions is possible, the countywide ordinance will provide the greatest waste reduction impact. The consistency beyond city boundaries will limit confusion and effectively help communities shift to ore reusable products. Subsequent steps are anticipated to include a California Environmental Quality Act (CEQA) analysis, technical assistance, phased implementation, outreach, and a complaint-based enforcement. This option may cost StopWaste approximately $1.2M in fiscal year 2019-2020 and fiscal year 2020-2021, with an ongoing annual cost of approximately $350,000. It is expected that StopWaste will request funding from all member agencies to help fund the countywide ordinance. At this time the amount of funding StopWaste will ask jurisdictions for is unknown. However, jurisdictions can use Measure D funds to cover these expenses. The City could choose to bolster the effectiveness of a County-wide ordinance by providing supplemental outreach or our own complaint-based responses.

Alternatively, the StopWaste model ordinance gives member agencies the greatest amount of flexibility. Cities will be able to adopt difference regulations regarding single-use disposable to meet their jurisdictions

Ms. Hopkins requested that Mr. Daggy forward his name and information, and staff will share if applicable. She indicated that in the future any agenda or presentation requests can be sent to Ms. Brown or brought up at the meeting. She reported that she has a regularly scheduled conference call with Ms. Brown and Ms. Chang to set the committee agenda.

Ms. Chang reported that she was accepted into the Master Gardener Program.

Mr. Gan reported he will be conducting some additional research and return to the committee in the future with some possible solutions. He indicated that he was going to reach out to the administration at Foothill to see if he could act as a liaison between 21st Century Leaders or in tandem to distribute surveys to students and provide additional outreach efforts for the CAP 2.0.

ADJOURNMENT

The meeting was adjourned at 8:25 p.m.

Next regularly scheduled meeting: March 25, 2020 at 5:00 p.m.

Respectfully Submitted,

Jennifer Tagalog

THE CITY OF PLEASANTON

The Committee on Energy and the Environment Meeting

Agenda Report

August 5, 2020

Item 4

SUBJECT: **CLIMATE ACTION PLAN 2.0 UPDATE**

SUMMARY

At the January 22, 2020 Committee on Energy and Environment (Committee) meeting, City of Pleasanton staff gave an update about the updated Climate Action Plan (CAP 2.0) development process. The update included a high-level schedule, consultant selection, website overview, and next steps. This report provides information to the Committee and community members of progress on CAP 2.0 project - including the Community Outreach plan, existing conditions documents, Vulnerability Assessment, greenhouse gas emission documents - and describe project next steps.

RECOMMENDATION

Receive and discuss update on the Climate Action Plan 2.0 project.

FINANCIAL STATEMENT

None.

BACKGROUND

Since the last Committee meeting in January, staff has been progressing several CAP 2.0 tasks, including a Community Outreach Plan, existing conditions, and City-wide greenhouse gas (GHG) emissions evaluation as further described below. This is an informational item meant for discussion, no action is required at this time. At the Committee's subsequent meeting, staff will ask for a Committee recommendation to City Council on suggested GHG emission reduction targets.

DISCUSSION

CAP 2.0 Process

Staff provided a high-level outline of the project's process in January. Due to COVID-19, the process (particularly as it pertains to community engagement) is slightly delayed. The initial project schedule is shown below in Figure 1. Staff has been working diligently to complete project tasks outlined in the schedule and further noted below.

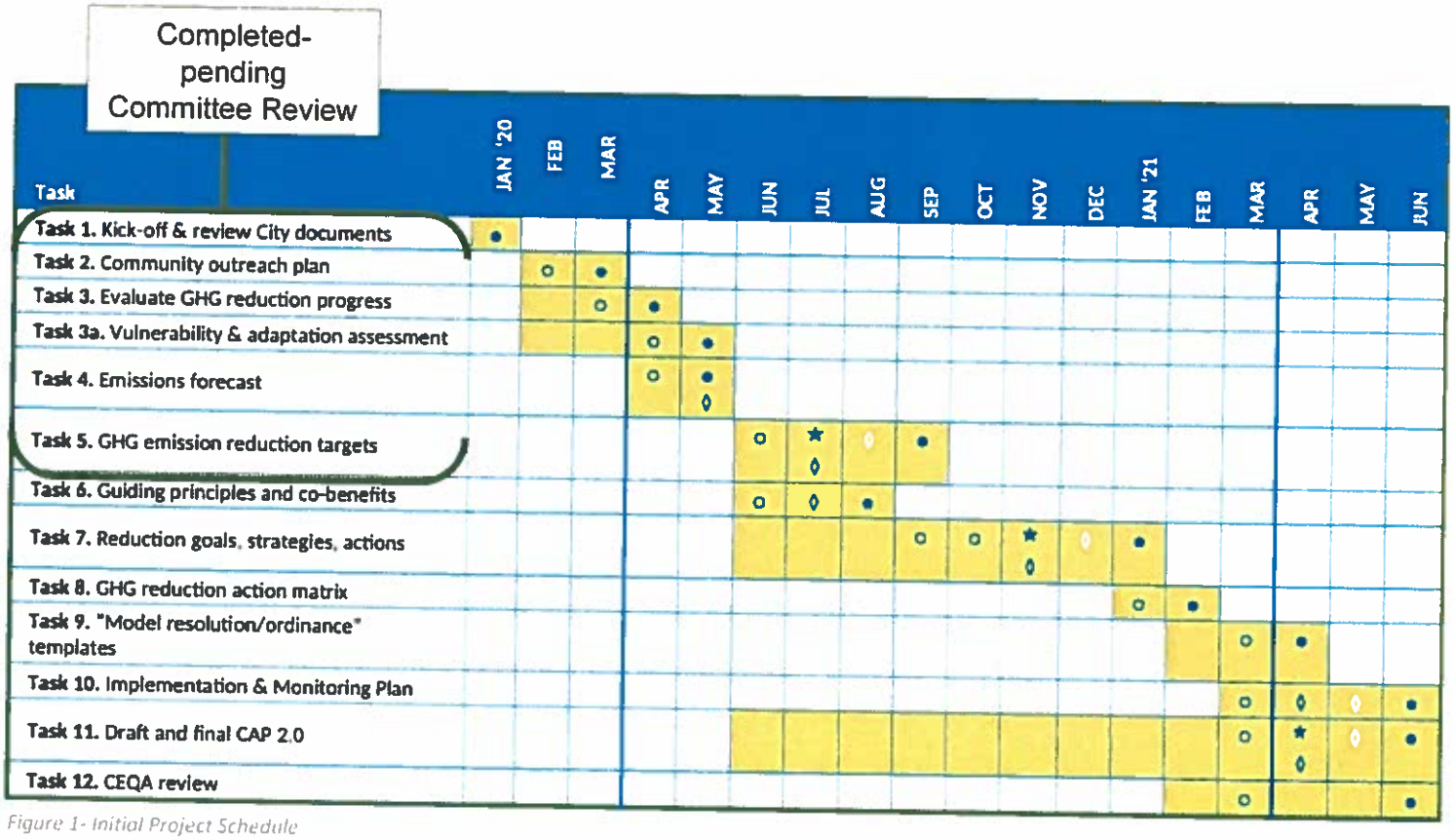


Figure 1- Initial Project Schedule

In this Agenda Report, you will find work products associated with the tasks outlined in the schedule as follows:

- Community Outreach Plan
  - Community Outreach Plan
  - Adjustments made due to COVID-19
  - Virtual engagement prepared to-date

- Existing Conditions
  - Baseline Assessment of Current Context
  - CAP 1.0 Progress
- Climate Vulnerability Assessment
- Greenhouse Gas Emissions
  - GHG Updated Inventory, Forecasting, and Target Pathways

The intent of this meeting is to review and discuss the Community Outreach Plan, existing conditions, and climate vulnerability assessment. Additionally, staff has provided the GHG emissions information (i.e., the updated inventory, forecasting, and potential target pathways). Staff asks for review of this information only with a detailed discussion and recommendation to follow at a subsequent meeting.

Community Outreach Plan

Integral to the CAP 2.0 process is a community outreach and engagement process that engages community members and stakeholders and aims to ensure the Climate Action Plan reflects the community's goals and vision. The Community Outreach Plan, Attachment 1, has been developed to provide a strategic framework for communicating with and engaging partners and the public in the climate action planning process. The City of Pleasanton will work with the consultant team to implement this Plan.

The City strives to achieve the following goals throughout the Community Outreach Plan implementation process:

- **Goal A**: Cultivate a shared understanding of the purpose, motivation, and value of the CAP to the City and individuals as well as the development process.
- **Goal B**: Gather community perspectives and feedback on the CAP that is representative of the makeup of the community to inform CAP development and guide decision-making.
- **Goal C**: Build communitywide support for advancing CAP priorities and implementing mitigation and adaptation actions.

In addition to outreach goals, the Plan outlines community key messages, milestones, priority audiences, and strategies. Outreach audiences include: decision-makers, implementation leads, several Commissions and Committees, advocate groups, critical perspectives, implementation partners, and the general public. It incorporates a wide range of outreach methods throughout the document.

Due to the COVID-19 pandemic, we have evaluated some alternative methods for conducting community outreach and these are included as an addendum to the Plan. In the near-term, suggested engagement includes outreach on social media and through City ListServes, videos on the CAP 2.0 website, online survey, utility billing insert, and online climate trivia, among other methods. Staff will also engage with implementation partners, critical perspectives, and advocates. Further stages of outreach will include a community workshop (adjusted to be digital as needed). As we are still amid the

pandemic, timing on suggested outreach is subject to change or may be further delayed.

Currently, a survey, introductory CAP 2.0 video, and factsheet about CAP 2.0 are all available on the CAP 2.0 webpage. Staff will track engagement activities and provide updates with feedback and outcomes of the engagement activities to the Committee.

No action is required by the Committee on the Community Outreach Plan at this time; however, staff requests the Committee review the Plan. Please advise if staff has not included key outreach audiences that should be added to the Plan.

Current Conditions

Baseline Assessment Memorandum

There are a variety of existing plans, policies, and documents (e.g., Pleasanton Pedestrian and Bicycle Master Plan and the Tri-Valley Local Hazard Mitigation Plan) related to the City's Climate Action Plan. Review of these existing documents is key to assess and garner a baseline understanding of Pleasanton's context both internally and in the broader East Bay region. A Baseline Assessment Memorandum, Attachment 2, was prepared outlining how the related City and regional plans, policies, and other documents interplay with CAP 2.0.

The Baseline Assessment Memorandum presents summary tables that describe:

- **Relevant Plans, Programs, and Policies** that inform current or future direction of climate activities in the City.
- **City Progress to Date** including climate achievements that the City has already made and notable climate activities within the City.
- **Identified Challenges and Gaps** that could hinder progress towards climate goals.
- **Potential Strategies, Actions, and Opportunities** as identified only through review of the documents—to consider when developing strategies and actions for the Climate Action Plan Update.

No action is required by the Committee on the Baseline Assessment at this time; however, staff requests the Committee review the memorandum to further understand Pleasanton's existing context.

CAP 1.0 Progress

Staff evaluated the progress in implementing the City's 2012 Climate Action Plan actions. The Progress Summary Memorandum, Attachment 3, outlines key achievements from the 2012 CAP, actions still in progress, and actions not yet started. Understanding the City's progress on CAP 1.0 implementation is critical before selecting CAP 2.0 actions.

No action is required by the Committee on the Progress Summary Memorandum at this time; however, staff requests the Committee review the memorandum to evaluate the City's progress on the original CAP actions.

Climate Vulnerability Assessment

The Climate Vulnerability Assessment, Attachment 4, is intended to anticipate future climate change impacts, and assess exposure, sensitivity, and adaptive capacity of various sectors. Assessing climate vulnerability can build resilience to a broad range of crises and hazards, including natural disasters, water shortages, and public health crises. Understanding climate vulnerability through the lens of public health, health and emergency responses, quality of life, and those that are disproportionately impacted is important now more than ever as we respond to the COVID-19 pandemic.

The Assessment provides a high-level overview of climate science, climate scenarios, and provides a summary of biophysical impacts of climate change (e.g., warmer temperatures, drought, water uncertainty, wildfires, etc.). The Assessment outlines a framework by which the City's vulnerabilities are assessed by reviewing exposure (i.e., the degree to which a system is stressed by the impacts of climate change), sensitivity (i.e., the degree to which that system is likely to be affected by the changes), risk (i.e., potential impacts), and adaptive capacity (i.e., the ability to moderate or cope with change). The vulnerability framework is applied to five focus areas including Energy and Public Infrastructure, Land Use and Transportation, Water Management, Natural Systems and Biodiversity, and Public Health. Further, the Assessment provides opportunities to enhance climate resilience across these sectors.

No action is required by the Committee regarding the Climate Vulnerability Assessment at this time; however, staff requests the Committee review and assess the City's vulnerabilities.

GHG Emissions Inventory, Forecast, and Target Pathways

The attached Greenhouse Gas memorandum and associated appendix, Attachment 5, outlines the City's GHG inventory, forecasted emissions through 2050 (in both business-as-usual and adjusted forecast scenarios), and suggests five emission reduction target pathways through 2050. The documents also summarize state GHG emission targets and progress toward the City's 2012 CAP targets. The memorandum provides a high-level summary and the appendix is a detailed analysis.

Staff recommends the Committee review both the memorandum and appendix in detail. No action is needed at this time. At the subsequent Committee meeting, staff will request Committee discussion and Committee recommendation to City Council.

Next Steps

Staff identified the following as next steps:

- Begin virtual outreach to community and implementation partners.
- Committee to discuss GHG emission reduction targets and provide a recommendation to City Council.
- Committee to discuss guiding principles and co-benefits and provide a recommendation to City Council.
- City Council check-in on GHG emission reduction targets, guiding principles, and co-benefits.

Staff asks the Committee to review and discuss the Community Outreach plan, existing conditions documents, and Climate Vulnerability Assessment. Staff also asks the Committee to receive the GHG emission documents. At the subsequent Committee meeting, staff will request Committee discussion about the GHG emission reduction targets and Committee recommendation to the City Council.

ATTACHMENTS:

1. Community Outreach Plan
2. Baseline Assessment Memorandum
3. CAP 1.0 Progress
4. Climate Vulnerability Assessment
5. Greenhouse Gas Emission inventory, forecast, and target pathways

Submitted by:

Megan Campbell
Associate Planner

Attachment 1

Community Outreach Plan

CITY OF PLEASANTON CLIMATE ACTION PLAN

CASCADIA CONSULTING GROUP, INC.

CASCADIA
CONSULTING GROUP

Community Outreach Plan

Background

The City of Pleasanton is updating its Climate Action Plan (CAP) seven years after its first launch with the aim of reducing greenhouse gas emissions and increasing resiliency of residents, businesses, and government institutions to climate change impacts. The plan will be an opportunity for the City to review its progress, celebrate success, and come together with the community to re-envision what a climate-smart future looks like and what path they want to take to get there.

Integral to this process is a community outreach and engagement process that meets community members on their terms and engages them with honesty and respect—ultimately, this will help ensure that the Climate Action Plan is widely supported and reflects the broader community's goals and vision. **This Community Outreach Plan (Plan) has been developed to provide a strategic framework for communicating with and engaging partners and the public in the climate action planning process.** The Plan outlines community outreach goals, key messages, milestones, priority audiences, and strategies. A consultant team led by Cascadia Consulting Group will work with the City of Pleasanton to implement this Plan.

Community Outreach Goals and Objectives

The City is committed to providing an open and inclusive community engagement process with ample opportunities to welcome residents, businesses, and other partners into the CAP process and **inspire them** to be a part of the City's climate-resilient future. The City also recognizes that City Council will only approve a CAP that has strong community support, so this engagement process will **bring community members into the process early and often**, keeping a pulse on their level of support and being responsive to issues that arise.

The City also aims to ensure its **internal stakeholders**—including staff, elected officials, as well as committee and commission members—are included throughout the process to keep them informed and engage them in developing strategies and actions in their respective areas of expertise. Therefore, in this CAP process, **"community" is defined as both internal City stakeholders as well as external community members and partners.**

A cornerstone of the engagement approach is **inclusivity and equity**. In the CAP process, this means taking the time to get to know the communities in Pleasanton, engaging them in culturally accessible ways, and being respectful and understanding of different backgrounds and attitudes. It means not only creating an environment that is inviting to people of all backgrounds, but also **meeting people on their terms**—taking proactive steps to overcome barriers to engagement that may exist for people.

We will **build upon and collaborate with other outreach efforts happening in the City and community,** specifically looking for opportunities to partner with organizations embedded in communities to reach a broad range of residents, businesses, and organizations in Pleasanton. We also recognize that other cities within Alameda County and the broader region have or are in the process of developing their own CAPs, so we will review those CAPs and related public engagement efforts to ensure that our messaging is not conflicting and to identify lessons learned from neighboring jurisdictions to integrate into Pleasanton's efforts.

The following goals will guide the community outreach strategy. **Note that the primary goal of this effort is to inform the planning process.** The project team will strive to also address the broader issues around climate

science and action through this process; however, outreach and engagement around these issues could also be included in the future as part of CAP implementation.

Goal A	**Cultivate a shared understanding** of the purpose, motivation, and value of the CAP to the City and individuals as well as the development process.	
	Objective	Clearly communicate about the CAP focus, boundaries, and intended use, as well as the role of community input in informing the final CAP.
	Objective	Convey how the CAP relates to and supports the interests and values of all audiences within the community.
Goal B	**Gather community perspectives and feedback** on the CAP that is representative of the makeup of the community to inform CAP development and guide decision-making.	
	Objective	Solicit meaningful input from partners and the public about their priorities for climate action and opportunities for building resilience collaboratively with the City and their communities.
	Objective	Ensure opportunities to provide input are accessible and equitable to community members across demographic indicators such as gender, age, race, ethnicity, income, and geographic location.
Goal C	**Build communitywide support** for advancing CAP priorities and implementing mitigation and adaptation actions.	
	Objective	Provide opportunities for community members to voice their priorities, concerns, and expectations—and be responsive to them—throughout the CAP process.
	Objective	Build in measures of accountability in the CAP itself to ensure ongoing community input during implementation.

Key Messages

These answers to important questions will be used to encourage broad participation by City residents, businesses, and organizations in the CAP development process.

Why should I participate in the Climate Action Plan development process?

- This is your opportunity to tell us your priorities and concerns when it comes to sustainable and resilient City and community practices and policies related to climate change.
- This is also an opportunity to highlight and bring together, in one place, a compendium of actions and progress that you, your City, and your community have made related to efficiency, sustainability, and resiliency.
- By participating in the CAP process, you have an opportunity to help guide the City's funding priorities. Given the City's limited resources and many competing demands, your input helps us be as responsive as possible to the community's shared priorities and needs.
- This CAP will lead directly to projects and money spent on the ground. It is not just a guidance document; by participating, you have an influence on public spending and project implementation.
- The CAP helps build a more resilient, responsive, and sustainable Pleasanton for its residents, businesses, and visitors.

Why is the Climate Action Plan being developed now?

- Greenhouse gas emissions from transportation, energy use, land use change, and other sources are changing our climate in ways that could put the community at risk. Projected changes in temperature, snowpack, severe storms, and wildfire risk could threaten City infrastructure, natural resources, and public health. By taking action to reduce the City's emissions and prepare for climate risks, the City will position itself to be ahead of the curve and protect the health and well-being of their citizens and economies.
- The City and community have been taking climate action for years. Particularly since the City's 2012 Climate Action Plan, the City has been working toward ambitious targets for reducing emissions and increasing resiliency. This is an optimal time to take a step back, review progress, reconsider our trajectory, and create a clear and coordinated strategy to move forward.
- The CAP will build on past efforts to establish a clear road map of priority actions and projects to be completed in the short- and long-term and will help direct on-the-ground project implementation funding.
- The purpose of the CAP is to identify priorities for reducing greenhouse gas emissions and preparing for climate change impacts in the City of Pleasanton and among the City's local partners and affiliates.

How will my input be used?

- Community input will be considered along with input from City staff, committees, and partners throughout the planning process. We will pair input from all of these stakeholders with available data, literature, lessons learned, and known best practices to develop the CAP. Specifically, your input will inform the CAP's overarching goals, vision, and targets; sectors of focus; and implementation strategies and actions.
- This CAP is part of an ongoing, iterative process that will evolve and grow over time. Actions or issues that cannot be addressed through this plan will be listed as suggested actions suitable or complementary to other projects, programs or services as deemed appropriate.

Demographic Information

The City seeks to engage a representative cross-section of City residents throughout the community outreach process. Specifically, the goal is participation across diverse socio-economic, geographic, occupational, racial, and ethnic backgrounds.

According to the US Census Bureau, the City of Pleasanton has an estimated population of approximately 83,000 persons in 2020. Other recent demographics are summarized as follows, based on 2018 5-year estimates:

Age	
Under 5 years	4%
5-19 years	23%
18-64 years	59%
65 and over	14%

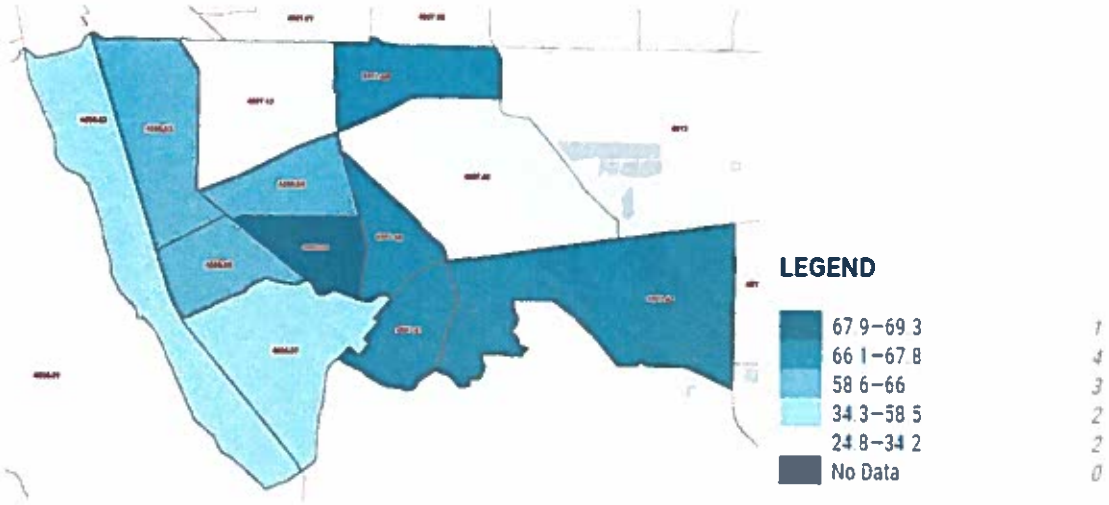
Race	
White alone	58%
Asian alone	33%
Black or African American alone	2%
Other race alone	2%
Two or more races	5%
Hispanic or Latino of any race	10%

Languages Spoken	
English only	65%
Asian and Pacific Island languages	18%
Other Indo-European languages	11%
Spanish	5%
Other	1%

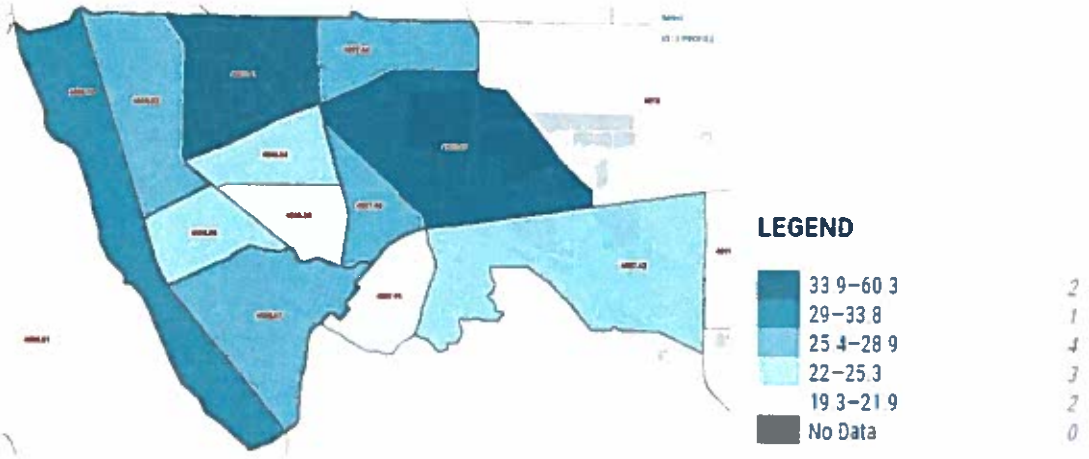
Residents' Place of Birth	
U.S.	70%
Born outside the U.S.*	30%
• Asia*	~76%
• Europe*	~10%
• Latin America*	~8%
**Regardless of citizenship status*	

The following maps with gradient symbology show distribution of Pleasanton residents by the two highest percentages of race as well as Hispanic or Latino ethnicity based on 2010 census tracts. The darker shading indicates a higher percentage of the census tract population that is of the given race/ethnicity.

White alone



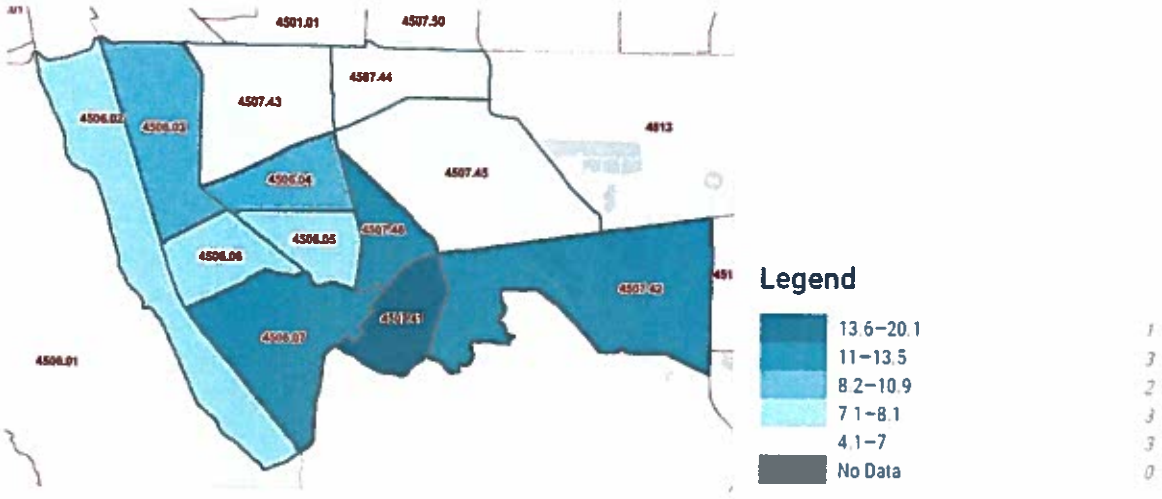
Asian[1] alone



Hispanic or Latino (of any race) [2]

[1] This can be disaggregated further for Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, and other Asian racial groups.

[2] This can be further disaggregated by Mexican, Puerto Rican, Cuban, and other Hispanic or Latino.



Priority Audiences

We will engage a diversity of individuals and organizations across the city to ensure the CAP captures the perspectives of those who will be affected by CAP implementation and those likely to be most affected by climate change and the City's adaptation and mitigation strategies.

Individuals and organizations within these groups will vary in their understanding of climate change and climate impacts and their level of support for climate action. Our approach is designed to engage a representation of the public across these spectra by reaching out to the following groups who are critical to implementing CAP strategies, will be most affected by CAP actions, and/or are typically harder-to-reach populations.

There is a spectrum of community engagement that allocates different levels of power to the community and uses different activity types, listed in the table below.[3]

[3] Adapted from the Movement Strategy Center's Spectrum of Community Engagement to Ownership.

1 Inform	2 Consult	3 Involve	4 Collaborate
Educate members of the group about the rationale for the project or decision; how it fits with City goals and policies; issues being considered, areas of choice or where input is needed.	Gather information and ask for feedback from group to better inform the City's work on the project.	Work directly and consistently with group to ensure their concerns are understood and considered in the City's planning process.	Create a partnership to work along with the City in developing and implementing the planning process or project.
Activities			
• Social Media • Emails/Newsletters • Open houses • Presentations • Factsheets	• Online surveys/polls • Public comment • Focus groups	• Interactive workshops • Community forums	• Citizen advisory committees • MOUs with community-based organizations • Open planning forums

For each audience to be engaged during the CAP process, there will be a specific goal and approach tailored to the role of the particular audience.

Audience & Description	Groups	Engagement Goal
Internal City stakeholders		
Decision-makers ***City leaders who make decisions that drive investment and policy***	• City Council • City Manager	**Inform** and update for decision-making
Implementation Leads ***City staff who are responsible for directing CAP implementation in departments***	• Department heads and staff	**Consult** to ensure support, align with priorities and processes, and gather feedback on actions
Guides and Analysts ***City commission/committee members whose support and direction are important for CAP development and implementation***	• Energy and Environment Committee	**Inform, consult** to gather feedback, and **collaborate** with to research information and guide CAP development
	• Youth Commission • Bicycle, Pedestrian and Trails Committee • Economic Vitality Committee • Parks and Recreation Commission • Planning Commission	**Inform** and gather feedback as needed on relevant action areas

External stakeholders		
Advocates ***Very supportive of climate action and willing to put in effort to support CAP process***	**Youth ambassadors** • Go Green/Local Leaders of the 21st Century	**Collaborate** with to conduct outreach to schools
	• Environmental community-based organizations (e.g., Tri-Valley Conservancy, Sierra Club)	**Collaborate** with to spread the word about the CAP
Critical Perspectives ***Groups frequently not reached during public processes but critical to equitable outcomes from CAP implementation***	• Communities of color • Limited/Non-English-speaking communities • Faith-based communities	**Involve** through tailored outreach to create accessible opportunities to participate in CAP process
Implementation Partners ***Conduct operations that affect the success of CAP implementation***	**Utilities** • PG&E • East Bay Community Energy (EBCE) • Zone 7 Water Agency • Dublin San Ramon Services District (DSRSD) (water treatment)	**Inform, consult** with to gather feedback, and **involve** in developing strategies in respective area of expertise
	Transit Agencies • BART • Wheels (bus transit) • ACE (rail)	
	Contracted Services • Pleasanton Garbage Service	
	Other public entities • Bay Area Air Quality Management District (BAAQMD) • StopWaste	
	Business community • Chamber of Commerce • Hacienda Business Association • Developers and Bay East Association of Realtors • Pleasanton Downtown Association	
General Public ***CAP strategies and implementation affect day-to-day lives***	• Various groups and communities	**Inform** throughout the process and **consult** on strategies and the draft CAP

Engagement Strategies

Effective engagement requires tailored approaches to the diverse needs, interests, priorities, and values of audiences. To that end, we will use several core engagement strategies that best suit the different priority audiences listed above, which strategically engages audiences around areas of interest, potential impact, geography, and key project milestones to meaningfully inform the CAP development. These approaches build upon successful strategies used in previous public engagement processes at the City.

The following table provides a high-level overview of the methods that will be used for each audience.

Audience	Method				
	Presentation at meeting	Existing community events (e.g., Earth Day, Farmers markets)	Targeted pop-up locations	Briefing/ Working meeting/ Focus group	Digital/print engagement (newsletter, social media, survey, mailing)
Decision-makers (City Council and Manager)	✓				
Implementation Leads (Department heads and staff)	✓			✓	
Guides and Analysts (Committees/commissions)	✓			✓	
Advocates (Youth ambassadors, environmental orgs.)		✓	✓		✓
Critical Perspectives		✓	✓	✓	✓
Implementation Partners				✓	✓
General Public		✓			✓

- **Optimize <u>Decision-makers and Implementation Leads'</u> time by using emails and attending standing meetings, as needed, to make it simple and streamlined for them to hear what's happening and give feedback.**
    - The overall goal with these audiences is for them to be aware of CAP development and share ownership over the strategies and actions.
    - We will prepare presentation materials for **City Council** at key milestones in the project: 1) existing conditions; 2) emissions reduction targets; 3) reduction goals, strategies, and actions; 4) draft CAP; and 5) the final CAP 2.0 (including implementation and monitoring plan).
    - In the first phase, we will prepare briefing materials for an **Executive Team meeting** to give an update about the CAP development and get initial feedback. After that, we will **send emails** to give them updates periodically.

- As the project progresses, we will coordinate with City staff to **email department heads and staff** periodically along the way to keep them informed about the CAP and request specific review and feedback on relevant parts of the CAP development.

- As needed, we may hold one-on-one phone meetings or conference calls and/or support presentations and focus groups with key staff to do deeper dives into strategies and measures, such as traffic engineer (e.g., transportation measures) or public works manager (e.g., stormwater measures).

- **Leverage the interests and expertise of Guides and Analysts by using tailored strategies to keep them informed and gather feedback on focused topic areas.**

  - **Energy and Environment Committee (EEC)**

    - The EEC meets on the 4th Wednesday every other month for approximately 1.5 hours. When we attend the meetings, **our role will be to plan, facilitate, and develop materials for a specified time slot in their agenda**, likely ~20-45 minutes depending on the content.

    - At the first meeting we attend, we will engage the EEC in an **initial presentation** to develop a shared understanding of the CAP development and their role.

    - During the phase of strategy and action development, we will invite EEC members to **conduct background research** on discrete topic areas and bring that information back to the EEC for discussion. This strategy is a way for members to contribute their expertise and participate more closely in the action development process.

    - We will ask the EEC to **review and provide feedback on draft products**.

    - We will also engage EEC members, as they are able and willing, to **volunteer** to staff tables/booths at events, workshops, and generally **spread the word** about the CAP around the community.

  - **Other Committees and Commissions** (Youth Commission; Bicycle, Pedestrian and Trails Committee; Economic Vitality Committee; Parks and Recreation Commission; Planning Commission)

    - We will prepare materials for City staff to give presentations to other commissions and committees to inform them of the CAP process and **solicit their feedback** on specific parts of the CAP that are relevant to their area of expertise. Consultant team will develop two rounds of presentation materials at two key points in the process: 1) action selection and analysis, and 2) draft CAP. City staff will adapt materials to suit the different committees and commissions as needed.

  - When presenting to all committees and commissions, we will aim to have a **focused topic for discussion and strong marketing** through the City's existing email list and social media to increase public awareness and attendance at the meeting.

- **Collaborate with advocates to leverage their experience with outreach and their relationships with their peers and communities, and to create space for their voices in the process.**
    - We will **partner with Go Green's Local Leaders of the 21st Century** initiative and Youth Commission Public Policy Subcommittee to use a train-the-trainer model to **train youth as ambassadors for the CAP process**, providing information about the process and collecting feedback at key points in the process at their schools and in their communities. The Youth Ambassadors, in partnership with consultant staff, will **engage with their peers** at school and potentially help with other outreach events.
    - In collaboration with Go Green, we will identify ways to engage youth who may not be involved in or directly connected to the Local Leaders of the 21st Century initiative, such as students at Village High School and youth involved in the Mariachi Program.
    - We will connect with leaders in **local environmental community-based organizations** (e.g., Tri-Valley Conservancy, Sierra Club) to identify individuals who are willing to serve as advocates for the CAP in their respective communities and potentially volunteer to help with outreach events. We will invite these volunteers to attend the training with youth (see above) and give them the outreach toolkit to support their advocacy efforts.
- **Use tailored strategies to make engagement opportunities in the CAP process as accessible as possible to communities that offer Critical Perspectives.**
    - We will **connect with the City's Public Information Officer** to identify communities that have been harder to reach in public engagement efforts and **identify tailored strategies** to engage these communities, such as pop-up events, one-on-one meetings, focus groups, and/or dynamic and interactive workshops.
        - **Additional sources to inform this assessment** include the City's affordable housing list and its Census outreach efforts, as well as partners like the Public Library (specifically from the 2020 Lunar New Year event) and Go Green.
    - We will **leverage existing partnerships** to reach all communities.
    - We will aim to **reduce barriers to communities' participation**, such as locating events conveniently to reduce travel time and associated expenses, providing child care, holding events outside of regular working hours, and providing written translation and verbal interpretation services.
- **Connect with Implementation Partners at key points during the CAP development process to inform them and leverage their expertise to get feedback on specific parts of the CAP.**
    - We will connect with Implementation Partners via email twice during the planning process to 1) **inform them about the CAP development** and 2) share the draft CAP.
    - We will also **gather their feedback on strategies** relevant to their respective areas of expertise. To do this, we will hold **one-on-one phone meetings or conference calls** and/or **support presentations and/or focus groups** around key strategy areas (e.g.,

transportation, waste and materials, energy, and water) to obtain a systems-level perspective and hear shared issues and priorities.

- **Take a broad-brushed approach to reach the general public, providing diverse options for learning about and participating in the CAP development process.**
    - We will hold an **interactive open house** to introduce the CAP development process and gather feedback.
    - We will host **pop-up booths at existing community events** (e.g., Earth Day and Farmers Market) as well as targeted commonly frequented locations (e.g., senior center) to share information about the CAP process and gather feedback.
    - We will use three rounds of **online surveys** to share updates about the CAP process and gather community feedback at key points throughout the project: 1) awareness building, 2) strategy development, and 3) draft CAP review.
    - We will provide content, as needed, for the City to distribute updates to the community along the way through:
        - **City CAP website** to provide up-to-date information on CAP status and documents available for review and comment (content provided 2 weeks prior).
        - **Social media** (Twitter, Facebook, Nextdoor, with a hashtag) to provide brief announcements about upcoming engagement opportunities, reminders for events, share-outs of photos and stories after outreach events (content provided ~7 days prior).
        - **City and community newsletters** to provide brief updates on CAP development status and share upcoming engagement opportunities (content provided ~8 weeks prior).
        - **Utility bill mailing** to provide brief updates on CAP development status and share upcoming engagement opportunities (draft content provided six weeks prior; billing department needs at least two weeks).
        - **Email communications** to manage and coordinate responses to project-related inquiries, distribute and manage invitations to events, draft and send newsletters, coordinate review of project materials, etc. (content provided as needed).**Newspaper advertisement** in The Pleasanton Weekly, which is a common source for news among many residents, to promote the CAP.
    - We will create an **outreach toolkit** (see section below) with materials for City staff and Youth Ambassadors to use for conducting outreach.
    - We will provide **information in common languages spoken** by residents and in **both digital and print format** (i.e., mailing combined with utility bill), especially to reach residents who do not have computers or easy access to online platforms.

- During the CAP process, if there are **groups that express opposition** to the CAP (such as in relation to housing, transit, and development), we will consult with City staff on the most appropriate way to engage the group, such as through focus groups, to hear their concerns, convey the goals and scope of the CAP, and reach an amicable resolution, but not necessarily agreement.

Outreach Toolkit

Includes materials for conducting outreach. This will be provided to City staff, Youth Ambassadors, and any others who will be conducting outreach. The consultant team will train City staff and volunteers to use this toolkit at pop-up events, internal City meetings, and other engagement events or already-planned public events, effectively broadening the scope of outreach. We will hold a 1-2 hour online training webinar to guide staff and volunteers (e.g., Go Green) through the components of the toolkit. This toolkit is envisioned to especially help reach communities who are typically not involved in public processes or are unlikely to come to an in-person event or take a survey. All materials will be in English, Spanish, and Chinese languages and have digital and printed versions. The toolkit may include:

- Branding for the plan, including plan name, color scheme, and social media tags (i.e., hashtags)
- 2-page FAQ factsheet about the CAP goals, scope, planning process, and ways to engage
- "Business card" or quick reference card with the CAP website and QR code to sign up for updates
- PowerPoint presentation for briefings
- Talking points for those using the toolkit
- Easy-to-use methods to gather input (e.g., digital questionnaire)
- Instructions about what to do with the input gathered
- Up to 4 poster boards to convey information and gather feedback through interactive activities

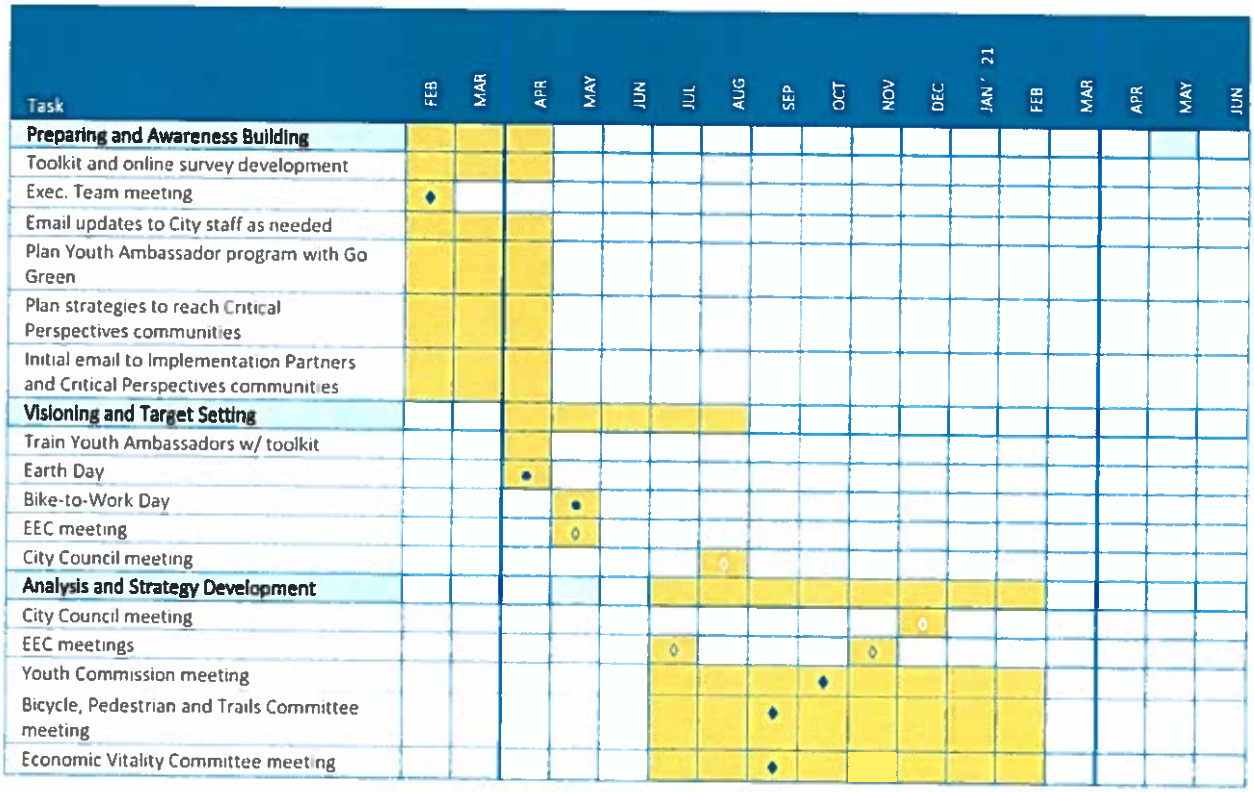
Measuring Success

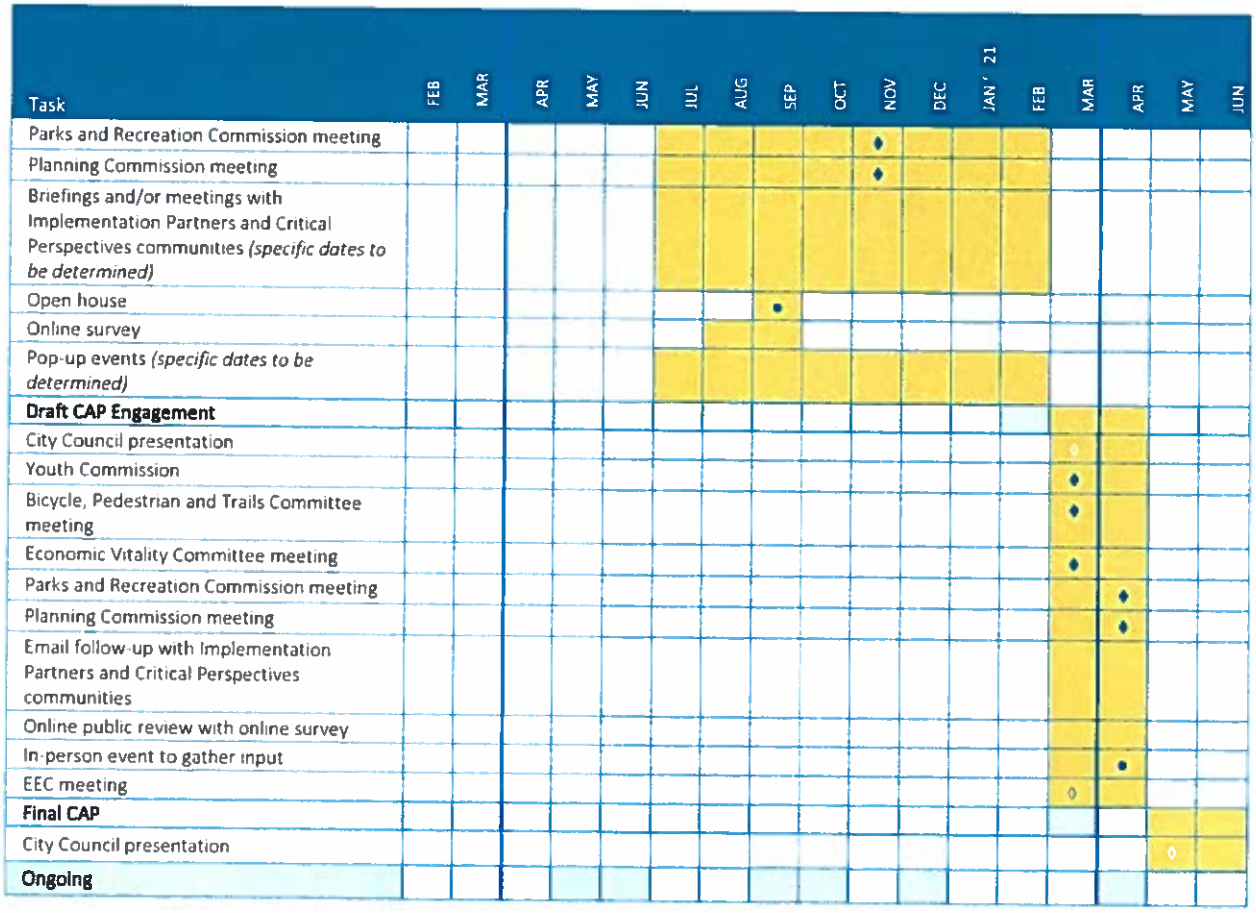
Tracking engagement is important to ensure that we are meeting our goals and objectives for community outreach, especially gathering feedback and perspectives that are representative of the entire community and making engagement opportunities accessible and inclusive. We will track engagement activities regarding who was reached and what outcomes were achieved to assess how we are doing to reach audiences, re-direct as needed, and prioritize activities moving forward.

Timeline

The timeline below depicts the timing and sequence of key engagement events as they relate to phases of the climate action planning process.

● = Public event | ◊ = EEC meeting | ♦ = Meeting/focus group/presentation | = City Council presentation on key deliverable




Task
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN ' 21
FEB
MAR
APR
MAY
JUN
Parks and Recreation Commission meeting
Planning Commission meeting
Briefings and/or meetings with Implementation Partners and Critical Perspectives communities (specific dates to be determined)
Open house
Online survey
Pop-up events (specific dates to be determined)
Draft CAP Engagement
City Council presentation
Youth Commission
Bicycle, Pedestrian and Trails Committee meeting
Economic Vitality Committee meeting
Parks and Recreation Commission meeting
Planning Commission meeting
Email follow-up with Implementation Partners and Critical Perspectives communities
Online public review with online survey
In-person event to gather input
EEC meeting
Final CAP
City Council presentation
Ongoing

Task	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN ' 21	FEB	MAR	APR	MAY	JUN
Website updates																	
Newsletters																	
Social media																	
Mailings in utility bill – 1-2 throughout																	

Budget

The table below describes how the community outreach budget will be spent and key assumptions about the responsibilities of City staff and the consultant team.

Engagement Approach	Frequency	Budget
Engagement toolkit development and training	1 *Assumes toolkit materials will be used for engagement events.*	$7,900
Open House	1 *Assumes consultant team develops materials and facilitates, and City supports logistic and event planning.*	$15,000
Community engagement events (e.g., Earth Day, farmers markets, pop-up events)	4+ *Assumes consultant team will attend one, and more if time/budget allows. Consultant team coordinates with Go Green/youth to volunteer and assist staff at events.*	$4,000
City Council Meetings	4 *Assumes consultant team supports City staff to develop presentation materials. Consultant team will attend 2 meetings; City staff will deliver presentation at all meetings.*	$3,000
Committee on Energy and Environment meetings	2 *Assumes consultant team presents at 2 out of the 8 meetings during the project period, and facilitate discussions or exercises.*	$3,000
Other Committee/Commission Briefings	Up to 10 *Assumes consultant team develops 2 rounds of presentation and materials for City staff to deliver and facilitate.*	$2,500
Stakeholder Meetings/Focus Group Discussions	Up to 10 *Assumes consultant team develops presentation and materials and facilitates at 5 meetings; City staff to facilitate remaining meetings.*	$6,500
Online Survey	3 *Assumes consultant team develops the survey and compiles summaries of responses.*	$5,000
Webpage & Social Media	*Managed by City. Consultant will provide content.*	$500

Engagement Approach	Frequency	Budget
Newsletter & Mailings	*Managed by City. Consultant will provide content.*	$500
Email communications	*Mostly managed by City. Consultant may provide occasional input on responses and may email department heads and staff periodically.*	*Negligible*
Travel expenses to meetings	*Round trip travel expenses for consultant team to attend 12 meetings/events; assumes all meetings/events occur on separate days.*	$1,400
Printing	*Consultant team will print up to 4 display boards for outreach materials; City will be responsible for all other outreach printing costs, including outreach materials and meeting packets. (Consultant team will cover printing costs for drafts of the CAP 2.0 document.)*	$200
	Total	$49,500

Roles

General roles and responsibilities for implementation of this Community Outreach Plan are as follows, and detailed in the sections that follow:

Consultant Team	City
• **Develop outreach toolkit** • **Develop content for communications/marketing** • Document, review, and synthesize stakeholder and public comments • **Materials, preparation, and facilitation for at least 12 events and meetings, including meetings with committees and/or City staff, focus group discussions, community and City Council presentations (see Budget for details on when and with whom)**	• Manage project website, social media, email and newsletter communications, and utility mailings • Create press releases • Support preparation and day-of event logistics, including refreshments and materials • Brief Executive Team and other leadership intermittently, as needed • Email to maintain contact with department directors and staff • Coordinate internal City communications and make introductions to partners • Attend all commission, EEC, Council, and major community/stakeholder meetings.

Feedback Integration

We will review and document all partner and public comments and track them in a database. After each major phase of the process (i.e., visioning/target setting, strategy/action identification/refinement, and draft plan review), **we will provide an updated version of the database** to the City to see the comments and input received as well as any additional City input needed on pending issues. All of this information will be integrated, as appropriate, into a final version of the CAP to be presented to the City for adoption.

Appendix A. Outreach Events

This list of outreach events with brief information relevant to the event will be further developed throughout the course of the project.

Earth Day | April 18, 2020

- Approximately 15 booths on various environmental/sustainability topics with activities, performances, and possibly workshops
- Attendance: ~400 residents
- Materials: poster, outreach toolkit materials, potentially stickers and/or giveaway items

Bike-to-Work Day | May 14, 2020 | 7-9am

- Energizer stations providing giveaway items to bike commuters
- Foothill High School station sponsored by the City in 2019

Farmers Markets | Saturdays 9am-1pm | W Angela St. and Main St.

Addendum: Virtual Engagement

Due to the COVID-19 pandemic, the City of Pleasanton explored alternative methods for conducting community outreach for the Climate Action Plan 2.0. The City considered the appropriate ways to proceed with climate action planning, given the City's priority of COVID-19 response and public health and safety. The City also explored strategies to make engagement opportunities as accessible as possible to the entire community, including reaching audiences who may not have access to the internet. Based on these considerations, the City identified the following approaches listed in the table below as viable options for proceeding with CAP 2.0 outreach.

VIRTUAL ENGAGEMENT BUDGET		
Engagement Approach	Frequency / Assumptions	Budget
Development of virtual engagement approach	*Assumes internal consultant team meeting and check-ins with client to confirm approach*	$1,000
Youth video challenge	*Consultant team develops challenge, plans platform/logistics and liaises with youth. Assumes two 1-hour meetings with youth. City supports coordination as needed, posts video(s) on website and social media, and collection/compilation of videos.*	$2,250
Online trivia	*Consultant team develops 10 trivia questions, including answer and brief statement to tell the story/context of the question. City coordinates hosting on website and manages responses.*	$1,000
Virtual training for advocates to promote CAP in their community	*Consultant team develops new content (how to engage online) beyond what has already been drafted for the traditional toolkit training. New content will be used in training for the EEC. City to help coordinate with EEC. Timing TBD.*	$500
Talking points & images for social media posts	*City to develop*	*$0*
Listserv message content	*City to develop*	*$0*
Introductory video to CAP 2.0	*City to develop*	*$0*
Virtual display boards / Ask the community a question	*City to develop*	*$0*
	TOTAL	**$4,500**

To: Megan Campbell, City of Pleasanton

From: Andrea Martin and Maddie Seibert, Cascadia Consulting Group

Date: March 13, 2020

Re: Pleasanton Climate Action Plan Update – Baseline Assessment

Overview

This memorandum summarizes findings from a review of Pleasanton's past and current climate-related activities and context. Understanding this background will help inform and guide an effective Climate Action Plan Update that reflects, leverages, and is consistent with Pleasanton's current plans, programs, and goals.

The memorandum includes findings from a literature review of related City and regional plans, policies, and other available documentation. It includes only a brief review of the 2012 Climate Action Plan and does not include a review of the 2012 CAP's City progress report, as that will be conducted as part of Task 3 of the consultant scope of work.

Findings in this memorandum are organized (and color-coded) by the following focus areas:

Focus Area	What's Included
Cross-cutting (general)	Cross-sectoral opportunities to build resilience to climate change impacts and reduce emissions.
Transportation & land use	Strategies to reduce transportation emissions and enhance community mobility.
Buildings & energy	Options to increase renewable energy use and energy efficiency.
Materials management & waste	Pathways toward sustainable consumption, zero waste, and increased recycling.
Natural systems	Strategies to enhance resilience and carbon sequestration of natural systems, green spaces, and water resources.

This document presents summary tables that describe:

- **Relevant Plans, Programs, and Policies** that inform current or future direction of climate activities in the City.
- **City Progress to Date**, including climate achievements that City has already made and notable climate activities within the City.
- **Identified Challenges and Gaps** that could hinder progress towards climate goals.
- **Potential Strategies, Actions, and Opportunities**—as identified only through review of the documents—to consider when developing strategies and actions for the Climate Action Plan Update.

Literature Review

Background research included review of available information and documentation related to City activities.

Cross-cutting (general)

Tri-Valley Local Hazard Mitigation Plan (2018)
StopWaste's Climate Change Adaptation Measures: Building and maintaining soil health to assist in climate change mitigation (2018)
Emergency Operations Plan (2018)
Pleasanton General Plan – Air Quality and Climate Change Element (2005)
Pleasanton General Plan – Economic and Fiscal Element (2005)
Pleasanton General Plan – Housing Element (2005)
Pleasanton General Plan – Community Character Element (2005)

Transportation and Land Use

Downtown Pleasanton Parking Strategy & Implementation Plan (2017)
Downtown Specific Plan (2019)
Pleasanton Pedestrian and Bicycle Master Plan (2010)
Trails Master Plan (2019)
Pleasanton General Plan – Land Use Element

Buildings and Energy

City greenhouse gas inventories for 2012 and 2017
Pleasanton General Plan – Energy Element (2005)

Materials Management and Waste

The Alameda County Integrated Waste Management Plan (amended 2017)
SB 1383 Draft Text

Natural Systems

Zone 7 Water Agency Stream Management Master Plan (2005)
StopWaste's Climate Change Adaptation Measures: Building and maintaining soil health to assist in climate change mitigation (2018)
Urban Water Management Plan - Pleasanton Municipal Code (amended in 2016)
City of Pleasanton Recycled Water Use Guidelines (2015)
Pleasanton's General Plan Water Element (2005)
Pleasanton's General Plan Conservation and Open Space Element (2005)
Pleasanton's General Plan Land Use Element (2005)
Pleasanton 2018 Annual Water Quality Report and Pleasanton's Water Quality webpage

Cross-Cutting (General)

Relevant Plans, Programs, and Policies

- The **Climate Action Plan (2012)** is a framework for addressing climate change and recommends strategies to mitigate carbon emissions within city operations and the community. The goal was to reduce GHG emissions to 1990 levels by 2020.
- **Tri-Valley Local Hazard Mitigation Plan (2018)**, created in collaboration with the cities of Livermore and Dublin, aims to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster in the Tri-Valley area. It notes that management of natural resources is needed to address hazards and mitigation.
- **StopWaste's Climate Change Adaptation Measures: Building and maintaining soil health to assist in climate change mitigation (2018)** lists measures to build soil health to both sequester carbon and improve resilience of green spaces. Planning for stormwater management, sea level rise, higher temperatures, precipitation changes, and landslides can protect natural systems and increase their resilience.
- **City of Pleasanton Emergency Operations Plan (2018)** lists response protocols in the case of a natural disaster.
- City **greenhouse gas (GHG) inventories** for 2012 and 2017 quantify GHG emissions from transportation, energy, solid waste, and water/wastewater sectors.
- **Pleasanton General Plan – Air Quality and Climate Change Element (2005)**: "provides a guide to reduce air pollution, to meet federal and State air quality standards, and to address Pleasanton's efforts to become a more sustainable community." The Element assesses air pollutants and their sources and odors, lists policies relevant to climate change, and notes the relationship between sustainable development and air quality planning. It acknowledges overlaps with the Land Use Element, Circulation Element, Conservation and Open Space Element, Energy Element, etc.
- **Pleasanton General Plan – Economic and Fiscal Element (2005)** aims to maintain the City's strong and stable economic position. It acknowledges relationships to the Land Use Element and other planning elements.
- **Pleasanton General Plan – Housing Element (2005)** contains an assessment of housing needs and identification of sites for future housing development. It acknowledges connections to the Air Quality and Climate Change Element, Water Element, Community Character Element, and Energy Element.
- **Pleasanton General Plan – Community Character Element (2005)** addresses streetscapes, architecture, natural landscapes, and special interest areas integral to Pleasanton's character. It acknowledges relationships with the Land Use Element, Circulation Element, Conservation and Open Space Element, and Air Quality and Climate Change Element. It encourages preservation of natural spaces, sustainable landscaping, higher density, and trails, bike lanes, and other pathways to connect neighborhoods and provide an alternative to car travel.

City Progress to Date

- The City uses periodic GHG inventories to track emissions over time.
- The City has identified major regional environmental hazards and climate change hazard mitigation strategies.

Identified Challenges and Gaps

- CAP:
  - Limited ability to mobilize hard-to-reach populations, such as communities of color and non-English speaking communities.
  - A long list of actions with limited prioritization.
- Tri-Valley Local Hazard Mitigation Plan:
  - Some uncertainty in data and modeling behind local hazard mitigation assessment.
  - Some uncertainty in projected climate change impacts.
- GHG inventories:
  - Mixed data sources and frameworks used make inventories difficult to interpret (this is being addressed through the current CAP Update process).

Potential Strategies, Actions, and Opportunities

- Include focused measures and build a strong implementation plan for the next CAP.
- Rely on local partnerships and a varied engagement strategy to reach previously uninvolved communities.
- The City's General Plan already acknowledges the intersections and overlaps among different Elements, which enables the City to advertise cross-cutting benefits of climate actions.

Transportation and Land Use

Relevant Plans, Program, and Policies

- **Climate Action Plan (2012)** contains measures related to transportation, with goals to reduce VMTs, promote active transportation, and manage parking demand.
- The **Downtown Pleasanton Parking Strategy & Implementation Plan (2017)** aimed to describe the existing travel and parking behaviors within the downtown core and identify solutions to align parking supply and demand. It forecasts demand and proposes implementation strategies.
- **The Downtown Specific Plan (2019)'s goal is to** improve upon the commercial and residential vitality of the downtown while preserving the traditions of its small-town character and scale.
- The goals of the **Pleasanton Pedestrian and Bicycle Master Plan (2010)** were to improve safety for pedestrians and bicyclists and encourage active forms of transportation by creating networks of lanes and pathways, establishing design guidelines, and educating residents.
- The **Trails Master Plan (2019)** is an update to the Community Trails Master Plan in 1993 to identify and improve the City's trail system, establish standards for existing and proposed trails, rank priority projects, identify funding for those projects, identify opportunities to complete the regional trail system, and inform future trail development.
- The **Pleasanton General Plan – Land Use Element (2005)** provides a description of planned residential, commercial, and industrial lands and provides guidance for the use of public and open-space lands. It addresses growth management, the relationship between jobs and housing, smart growth strategies, mixed use development, and transit-oriented development. Document goals include:
    - Create a land use pattern that promotes resource sustainability and environmental quality.
    - Achieve and maintain a complete well-rounded community of desirable neighborhoods, a strong employment base, and a variety of community facilities.
    - Develop in an efficient, logical, and orderly fashion.
    - Encourage the participation of residents, businesses, and neighboring jurisdictions in planning for community development.

City Progress to Date

- City Council adopted a **Complete Streets** policy in December 2012.
- **School traffic calming** measures are in place. The Pleasanton Police monitor the school crossing guard program, as well speeds and traffic safety; the Traffic Engineering Department reviews the need for signing and striping; and the School District can recommend site redesign to promote safety.
- Acquisition of the **Alameda County Transportation Corridor**. The Downtown Pleasanton Parking Strategy and Implementation Plan notes that this enables the City to design the corridor for increased parking and biking and pedestrian travel.
- **Transportation emissions** appear to have decreased between the 2012 and 2017 GHG inventories by approximately 4 percent.

Identified Challenges and Gaps

- Many of the people traveling through Pleasanton are commuters to SF/Oakland/South Bay/Peninsula.
- There is limited funding for initiatives at schools, and projects at schools are out of the City's purview.
- The Downtown Specific Plan restricts the installation of parking meters in the Downtown area.

Potential Strategies, Actions, and Opportunities

- None identified.

Buildings and Energy

Relevant Plans, Program, and Policies

• **Pleasanton General Plan – Energy Element (2005)** aims to guide the City towards a sustainable energy future. The plan lists several strategies to reduce community energy use and promote renewable forms of energy. Goals **of the document include:**
  ○ Move toward a sustainable energy future that increases renewable energy use, energy conservation, energy efficiency, energy self-sufficiency, and limits energy-related financial burdens in Pleasanton.
  ○ Save transportation energy by implementing a more effective transportation system.
• City **greenhouse gas (GHG) inventories** for 2012 and 2017 quantify GHG emissions from transportation, energy, solid waste, and water/wastewater sectors. These also address forecasts and monitoring.

City Progress to Date
• In 2019, Pleasanton joined **East Bay Community Energy,** which enables procurement of electricity from clean, renewable energy sources. • The City's website offers several regional energy efficiency programs and incentives that businesses and residents can use. • Pleasanton has an **ENERGY STAR Portfolio Manager program** account to record and track consumption data of municipal buildings. • Energy emissions appear to have decreased between the 2012 and 2017 GHG inventories, by approximately 9 percent.
Identified Challenges and Gaps
• The greenhouse gas inventories use different frameworks and estimates for population and jobs.
Potential Strategies, Actions, and Opportunities
• Leverage EBCE membership.

Materials Management and Waste

Relevant Plans, Program, and Policies
• The **Alameda County Integrated Waste Management Plan (amended 2017)** identifies solid waste facilities and wastesheds within Alameda County. It describes the countywide plan for reaching the state-mandated 50% recycling goal and the county-mandated 75% recycling goal. • Upcoming regulation **SB 1383** requires organics recycling, procurement of organics recycling products, edible food rescue, and public outreach and education.
City Progress to Date
• The City enforces Alameda County Waste Management Authority's **Mandatory Recycling Ordinance**.
Identified Challenges and Gaps
• Waste is not identified in Pleasanton's General Plan as an Element alongside energy, water, etc.
Potential Strategies, Actions, and Opportunities
• SB 1383 is a significant opportunity to boost organics recycling and edible food donation. • There is opportunity for a consumption-based inventory and greater focus on single-use materials.

Natural Systems

Relevant Plans, Program, and Policies

- **Zone 7 Water Agency Stream Management Master Plan** aims to create a flood protection program by protecting and enhancing natural riparian landscapes.
- **StopWaste's Climate Change Adaptation Measures: Building and maintaining soil health to assist in climate change mitigation (2018)** lists measures to build soil health to both sequester carbon and improve resilience of green spaces. Planning for stormwater management, sea level rise, higher temperatures, precipitation changes, and landslides can protect natural systems and increase their resilience.
- The **Pleasanton General Plan – Land Use Element (2005)** provides a description of planned residential, commercial, and industrial lands and provides guidance for the use of public and open-space lands.
- The **Pleasanton General Plan – Water Element (2005)** presents information related to conservation and management of water resources, riparian corridors, and watershed lands. It also addresses water and wastewater capacity and stormwater facilities. Goals include "restoring and retaining the health of water courses and riparian corridors, conserving water supplies, storing surface waters, recharging the groundwater basin, and retaining water quality at healthy levels."
- The **Pleasanton General Plan – Conservation and Open Space Element (2005)** provides guidance to conserve and manage natural resource and open space areas for preservation, production of resources, and recreation. It covers conservation and management of animal and plant life; soil, sand, and gravel resources; cultural resources; water habitats; agriculture; public health and safety; and wildlands.
- **Urban Water Management Plan - Pleasanton Municipal Code (amended in 2016):** This document presents a guide for planning for a safe and adequate water supply with the recognition that the City was committed to conserve water and carefully manage existing resources.
- **Pleasanton Recycled Water Use Guidelines:** this document works in conjunction with the City's Recycled Water Standard Specification to outline design, installation, operation, and maintenance regulations and guidelines for on-site recycled water facilities.
- **2018 Pleasanton Water Quality Report and the Pleasanton Water Quality web page** present water quality information to comply with state health regulations. The Water Quality Report is also known as a consumer confidence report (CCR). The web page contains some information about PFAs that will be included in the 2019 CCR.

City Progress to Date

- The **Arroyo del Valle** and its protected open space riparian buffer are the last remaining protected open space in Pleasanton and border the downtown area.
- The **Recycled Water Use Guidelines** are a forward-thinking and comprehensive reference that can be used immediately by on-site recycled water facilities. In 2016, Pleasanton began installation of a recycled water pipe system for irrigation; it's projected to save 450 million gallons of potable water.

Identified Challenges and Gaps

- Work regionally with the Tri-Valley cities to integrate **landscape management.**
- The Pleasanton **Water Quality** web page notes that in 2019, **PFAs** were found in all three wells serving Pleasanton, and Well 8 in particular has tested above the notification level of PFOA, or perfluorooctanoic acid. This is an ongoing management and communication challenge.

Potential Strategies, Actions, and Opportunities

- Promote open space preservation and land management strategies as a way to preserve scenic hillside and ridge views and Pleasanton's small-town character.

CASCADIA
CONSULTING GROUP

Attachment 3

TO: Megan Campbell and Zachary Reda, City of Pleasanton
FROM: Andrea Martin and Tristan Smit, Cascadia Consulting Group
SUBJECT: Progress Summary for the Pleasanton 2012-2020 Climate Action Plan
DATE: June 2020

INTRODUCTION

Cascadia Consulting Group reviewed the City of Pleasanton's 2012-2020 Climate Action Plan (CAP) and CAP monitoring documentation to summarize the City's progress in implementing CAP measures. This memo presents a series of tables that summarize progress by focus area, including:

- Overall action progress (percent of actions completed; see Table 1 below)
- Overarching focus area goals
- Key achievements
- List of actions in progress or completed
- List of actions that were not initiated and the corresponding rationale

Table 1. Description of focus area status rankings.

Excellent	76-100% of actions are complete or in progress
Good	51-75% of actions are complete or in progress
Moderate	26-50% of actions are complete or in progress
Needs Improvement	0-25% of actions are complete or in progress

Focus areas for the 2012-2020 CAP are as follows and described below:

- Water & Wastewater
- Solid Waste
- Land Use
- Transportation
- Energy
- Community Engagement

Water & Wastewater

Water & Wastewater		
Focus area status: EXCELLENT		
65% of actions are **COMPLETE**	14% of actions are **IN PROGRESS**	21% of actions are **NOT YET STARTED**

Goals:

- Conserve community and municipal water through building and landscape design and improvements.
- Increase or establish use of reclaimed/grey water systems.

Key Achievements:

- City is following State requirements and hired an **Environmental Services Manager** who handles current and new conservation activities and policies. (WA1-1)
- Development and implementation of the **Water Conservation Program** to improve landscaping and irrigation practices through rebates and retrofits. The program also supports the improvement of outdoor water efficiency through educational services and efficiency outreach/education. (WA1-2, 1-3)
- Expanded installation of **smart water meters**, with over 20,000 new Ami meters installed and 500 existing meters retrofitted. (WA1-5)
- The City's **Water Efficient Programs** provide incentives for replacing lawn areas at business parks and to promote more trees and xeriscaping. (WA1-8)
- **"Smart" irrigation systems** installed throughout 80 acres of City-owned land.(WA2-1)
- **Water conservation devices** required and installed for all new constructions and additions to public facilities.(WA2-2)
- **Passive Incentives** (e.g., lower rates, no drought restrictions) exist for customers to convert to recycled water. The City supplemented that with an ordinance requiring targeted customers to connect to recycled water with enforceable penalties for noncompliance. (WA3-3)

Actions Still in Progress:

- *Implement a landscape ordinance for requirements on landscape water budgets and irrigation technology (WA1-4):* Implemented on an on-going basis by the Landscape Architecture Division.
- *Restrict the use of utility-provided water for cleaning vehicles and outdoor surfaces (WA1-6):* Municipal Code 9.30 reflects water use under various supply conditions.
- *Restrict landscape watering; encourage xeriscaping and drought-resistant planting in lieu of lawns (WA1-7):* Implemented on an on-going basis and is on current CAP checklist for private development projects.
- *Recycled Water Program (WA3-2):* Has been developed and is actively connecting customers to the reclaimed wastewater systems.

Actions Not Yet Started:

- *Investigate feasibility of stormwater runoff (WA3-1):* Not yet implemented by Water Conservation Coordinator.
- *Rainwater harvesting (WA3-4):* A study on the potential impacts/benefits determined this program would not result in significant water savings.

Solid Waste

Solid Waste		
Focus area status: GOOD		
50% of actions are **COMPLETE**	15% of actions are **IN PROGRESS**	35% of actions are **NOT YET STARTED**

Goals:

- Increase recycling, organics diversion, and waste reduction associated with municipal operations and for the entire community.

Key Achievements:

- Launched **municipal compost and recycling** collection sites per County guidelines. (SW1-4)
- Expanded **residential curbside recycling** to collect and process more materials, including more types of plastics. (SW2-3)
- Expanded **residential yard and food waste** collection program to multifamily residences. (SW2-5)
- Expanded **commercial curbside recycling** to include organics. (SW2-9)
- Approved a requirement for all new and remodeled commercial and multi-family buildings to contain adequate space and logistics for **trash, recyclables, and compostable waste**. (SW2-12)
- Updated municipal building codes to enforce the **Construction and Demolition Debris Recycling Ordinance.** (SW2-6)
- Implementation of a **Battery Recycling Program** provided by PGS during regular trash pickup service. (SW-2-13)
- Adopted a **Mandatory Recycling and Composting Ordinance** that applies to both City and private sectors and updated infrastructure to increase the number of materials suitable for recycling and composting. (SW2-14)
- Ongoing **outreach and education around reducing waste generation** and increasing waste diversion. (SW2-7, 2-8, 2-16)

Actions Still in Progress:

- *Adopt a City goal of zero waste (i.e., 90% waste diversion) (SW1-1):* Ordinance adopted to require 90% waste diversion of concrete and asphalt related to construction and demolition. More dedicated staff time and funding is needed to complete action.
- *Expand residential yard and food waste collection program to multifamily residences (SW2-5):* Service available to MFD, however, further expansion is still needed.

Actions Not Yet Started:

- *Hire consultants to write a Zero Waste Implementation and Strategy Plan* (SW1-2)*:* Consolidated into the Community Zero Waste Plan. Staff time and funding still need to be identified and assigned.
- *Adopt an Environmentally Preferable Purchasing Policy (SW1-3):* No policy has been adopted.
- *Adopt a City resolution to achieve zero waste (defined as 90% diversion) citywide by 2025 (SW2-1):* No resolution adopted.
- *Develop community zero waste plan (SW2-2):* No plan developed.
- *Utilize Stopwaste.org to promote sustainable consumption outreach and education to businesses (SW2-10):* Not implemented.
- *Establish municipal ordinance requiring large and special events producers to create a plan for waste diversion (SW2-11):* Additional staff time and funding is needed to draft and pass ordinance.
- *Support state policies and implement local policy for extended producer responsibility (SW2-15):* Additional staff and funding needed to support and implement regional and statewide requirements.

Land Use

Land Use		
Focus area status: MODERATE		
13% of actions are **COMPLETE**	21% of actions are **IN PROGRESS**	66% of actions are **NOT YET STARTED**

Goals:

- Support infill and high-density development.
- Support mixed-use infill and new development near local-serving commercial areas.
- Improve transportation efficiency though design improvements.

Key Achievements:

- Key development sites near the east BART station have been rezoned for **high-density residential/mixed use**. (LU2-5)
- Created new standards and modified the municipal development codes to require that all new projects include **pedestrian and bicycle access** unless prohibited by the landscape. (LU3-6)
- Implemented numerous **traffic calming programs** in various neighborhoods to slow traffic speeds, reduce traffic-related noise, and increase safety for pedestrians, bicyclists, and vehicles. (LU3-7)

Actions Still in Progress:

- *Modify municipal development codes to incentivize transit-oriented development near BART stations, along transportation corridors, in business parks, and the Downtown (LU1-4):* A code amendment specific to this has not been done, but various sites near the east BART station have been rezoned for high-density residential/mixed use. Downtown zoning now includes medium and high-density housing and allows for mixed use development. The Hacienda design guidelines and PUD updates have been completed, which provide more flexibility in land use regulations for the business parks.
- *Implement neighborhood traffic calming projects (LU3-7):* The Traffic Engineering Division completes new traffic calming programs in various neighborhoods on a regular basis.
- *Development and mixed land-use codes (LU1-2, 1-3, 2-7, 2-9):* Formal codes have not been established, but key development sites throughout Pleasanton have been rezoned for high-density residential/mixed use, some initial incentives for high-density and infill have been created.

Actions Not Yet Started:

Create programs and modify development and land-use codes to:

- Incentivize the reuse of both residential and non- residential vacant and underutilized parcels (LU1-1).
- Incentivize residential in- fill (LU1-2).
- Incentivize higher density development near transportation hubs and employment centers (LU1-5).
- Increase densities at vacant infill sites to facilitate affordable housing development (LU1-7).
- Develop mixed use and/or locate work, residences, and services within walking distance of each other (LU2-1, LU2-3, 3-1).
- Provide land use flexibility for Hacienda Business Park (LU2-5).
- Create incentive program(s) that attract and support local-serving shopping opportunities and a mixture of land uses around BART stations (LU2-6, 2-8).
- Promote the use of LEED Neighborhood Development incentives for developers (LU2-10).
- Require new projects to include "NextBus" technologies (LU3-4).
- Require Complete Streets for private development (LU3-5)

Code amendments or incentives specific to list above have not been established, however, these measures have been added to the checklist for the updated CAP and the City is exploring opportunities to expand and/or establish the above codes and programs when updating other City plans.

Transportation

Transportation		
Focus area status: GOOD		
23% of actions are **COMPLETE**	40% of actions are **IN PROGRESS**	37% of actions are **NOT YET STARTED**

Goals:

- Improve and increase transit ridership with incentives, partnerships, and related investments.
- Enhance and maintain a safe, convenient, and effective system for pedestrians and bicyclists.
- Use parking programs, policies, and/or pricing to discourage single-occupancy vehicle (SOV) travel.
- Promote alternatives to work and school commutes.
- Improve and implement traffic smoothing techniques to reduce congestion.
- Develop a supportive community infrastructure for more fuel efficient and alternative fuel vehicles.
- Create a planned initiative to upgrade the City fleet to hybrid, electric, and/or alternative fuel vehicles.

Key Achievements:

- The City has been designated as a **Bicycle Friendly Community** by the League of American Bicyclists.
- Supported the implementation of the **LAVTA Rapid bus** that increased transit ridership and reduced travel time to and from Bart Station. (TR1-4)
- **Upgraded Central Master to allow for bus priority**, upgraded traffic signals along corridor for bus priority, and installed bus queue jump signals.
- Modified the municipal code (Chapter 17.26) to require new residential developments within 1/2 mile of transit to offer **discounted transit passes** as part of HOA amenities. (TR1-6)
- Increased **outreach and education on alternative transportation** options on City and venue websites for planned events, concerts, festivals, and conventions. (TR1-10)
- Created the **Trails Master Plan** that creates a connected trail system (NM1-13).
- Installed a **bicycle/pedestrian underpass** at the Johnson Drive Canal for a connection to Dublin.
- Implemented numerous **traffic calming programs** in various neighborhoods to slow traffic speeds, reduce traffic-related noise, and increase safety for pedestrians, bicyclists, and vehicles.
- Worked with the East Bay Regional Park District to complete the **Iron Horse Trail** through Hacienda Business Park and constructed three pedestrian/bicycle traffic signals on the trail.
- Implemented a **Walk and Roll** program and promoted installation of locking skateboard racks to promote and celebrate active transportation modes as a method for getting to school (NM1-16).

Actions Still in Progress:

- *Support LAVTA's Rapid Bus Program through frequent ridership and promotion on the City's websites (TR1-2): Ongoing promotion.*
- *Promote a more direct and convenient connection between BART and ACE rail service (TR1-3):* Ongoing, but the City constructed a bus loop at ACE station to promote a more direct and convenient connection between BART and ACE rail service.
- *Identify underused parking lots and other available paved areas that could increase park-and-ride accessibility near BART stations (TR1-7):* The City aided an Alameda CTC study, but no formal study has completed by the City.
- *Implement the Community Trails Master Plan through incentive program(s) (NM1-1):* A Capital Improvement Program was created for Pedestrian and Bicycle improvements than can include trail improvements.

Transportation

Actions Still in Progress (continued):

- *Updated the Pleasanton Pedestrian and Bicycle Master Plan (NM1-2)*: Plan increases safety and accessibility but incentive program(s) and modifications to development codes are still needed.
- *Adopted the Downtown Parking Strategy and Implementation (NM1-3):* The top strategy includes finalizing the design of the Transportation Corridor and constructing these improvements.
- *Incorporate bicycle detection at signalized intersections (NM1-7):* Bike-capable detection cameras are being installed based on funding. The City added bike lane detection to all traffic signals with bike lanes and upgraded cameras to differentiate between bikes and vehicles. The City is currently adding increased green extension for bikes.
- *Encourage businesses, office parks, and schools to provide safe, convenient bike racks and work (NM1-8):* Ongoing efforts with school districts to continue Rides to School program. Bike parking required for all development at Hacienda, however funding is a major issue for schools.
- *Cooperate and collaborate with East Bay Regional Parks District to complete the regional trail system, and with Zone 7 in completing its Arroyo Management Plan (NM1-14):* Ongoing, but the City worked with Zone 7 and EBRPD to create access agreement to the trail system. The trail surface was upgraded at several locations.
- *Preserve rights-of-way needed for local and regional roadway "complete streets" improvements and increased connectivity through dedication of land, as adjacent properties develop (NM1-18):*Adopted a Complete Streets Program and obtained right-of-way near Stoneridge Mall.
- *Modify the Complete Streets Program to ensure safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities (NM1-19):* The City adopted a Complete Streets Program but there have been no modifications to the development codes.
- *Provide incentives for attracting private self-service bicycle renting businesses, including the installation of bike rental vendors at BART and ACE stations (NM1-20):* No incentives created for bicycle renting, but a draft ordinance and pilot program for e-scooters has been created.
- *Incentives and code amendments to parking policy and pricing to discourage SOV travel (TDM1-1):* The Downtown Parking Strategy and Implementation Plan was adopted but need to formalize incentives and amendments.
- *City's Commendable Commutes Program (TDM2-2):* Ongoing efforts to work with employers to provide commute incentive programs. City employees are provided incentives to use commute alternatives or alternative work schedules.
- *Strengthen community-based carpool and ride-share programs (TDM2-8):* The City partnered with Scoop Technologies to provide carpool incentives to residents and employees; future opportunities to provide carpool incentives will be considered. Modify municipal codes to require dedicated parking spaces in new and modified developments or carpool, vanpool, alternative-fuel, and car- share vehicles (TDM2-10): This measure was discussed for implementation and is now on the current CAP checklist for private development projects.

Transportation

Actions Not Yet Started:

- *Create carpool programs to/from transit station parking and incentivize bike rental vendors at transit station (TR1-1):* No carpool program or bike rental incentives created.
- *Provide transit service within ½ mile of all residents in the city where and when the gross density surrounding or adjacent to feasible transit routes meets or exceeds 10-12 units/acre (TR1-5).*
- *Create incentives to develop park and ride lots found in study to identify underused parking lots (TR1-8):* No incentives created. Grant funding secured through Alameda CTC, but project is delayed.
- *Introduce a bus idling policy and/or ordinance to limit commercial and public diesel idling, where feasible (TR1-9):* A policy or amendment has not been completed, but has been added to the checklist for the updated CAP.
- *Develop and implement a transit system masterplan (TR1-11):* The master plan has not been implemented at this time.
- *Require appropriate bicycle-related improvements with new development (NM1-4):* No requirements developed. This item is on the CAP checklist provided to project proponents of new development applications.
- *Modify municipal development codes to require bike parking for non-residential and multifamily uses (NM1-5):* No modifications have been made but is on the CAP checklist.
- *Maintain bicycle routes with adequate sweeping and pavement repairs (NM1-6):* No programs for bike lane sweeping or repair have been implemented.
- *Place more bike racks throughout the city through the creation of incentive program(s), inclusion in the City's CIP, and/or modification of municipal development codes. (NM1-11):* No incentives or modifications have been made.
- *Provide secure, covered bicycle parking at major transit hubs including BART stations through the creation of incentive program(s), inclusion in the City's CIP, and/or modification of municipal development codes (NM1-12):* No incentives or CIP but four secured bike lockers have been installed at 200 Old Bernal.
- *As part of the Pleasanton Pedestrian and Bicycle Master Plan, provide educational opportunities for residents about bike/pedestrian safety. (NM1-15):* No education opportunities have been provided through the plan.
- *Preserve rights-of-way needed for local and regional roadway "complete streets" improvements and increased connectivity through dedication of land, as adjacent properties develop (NM1-18):* The City has obtained right-of-way around Stoneridge Mall for a complete streets project, but it's not yet in progress.
- *Develop and adopt revisions and/or additions to the municipal street standards and/or development codes where feasible to improve access, convenience, and safety for transit, pedestrians, and bicycle users (NM1-19):* Codes and incentives have not been completed but is on current CAP checklist.
- *Convert the City's fleet (trucks or generators) to biodiesel (VE2-2):* Following evaluation of the City's fleet, it was determined that the fleet was not compatible because biofuel has unique properties that are incompatible to Pleasanton's fleet.
- *Amendments to municipal code, partnerships, and infrastructure (VE1-1, 1-2, 1-3, 1-4, 1-5):* Measures to address these have non-measurable reductions in emissions but support other transportation and land use efforts; measures still need to be implemented related to increasing alternative and/or fuel-efficient vehicles.

Energy

Energy		
Focus area status: GOOD		
16% of actions are **COMPLETE**	44% of actions are **IN PROGRESS**	40% of actions are **NOT YET STARTED**

Goals:

- Use city codes, ordinances & permitting to enhance green building, energy efficiency, and energy conservation.
- Leverage state and local programs to increase energy efficiency and conservation.
- Establish & promote financing & financial incentive programs to support energy efficiency and conservation.
- Develop programs to increase energy efficiency and conservation.
- Implement local ordinances and permitting processes to support renewable energy.
- Promote use of renewable energy for municipal operations.

Key Achievements:

- The City hired an **Environmental Services Manager** to oversee implementation of energy, water, and sustainability measures. (EC2-1)
- Actively funded and participated in the **StopWaste Green Packages Program**, which included consumer education, workforce development, schools-based programs, and standards development for energy efficiency and green building. (EC2-3)
- Established a **Committee on Energy and the Environment** (EEC) to track and evaluate trends in energy demand, energy efficiency, and sustainability, and to make appropriate recommendations to City staff and City Council. (EC4-1)
- An **LED Streetlight Retrofit Project** was completed in 2013 and **5,400 sodium vapor streetlights** were converted to LED. (EG1-3)
- Expedited **"green" permits** and included outreach materials in all permit applications. "Green" permits include solar and renewable energy permits, and new construction/renovations according to "green building" guidelines. (ER1-2)
- The City has installed **solar panels** at the following locations: Operations Service Center, Police Department, Fire Station 4, and the Firehouse Arts Center.
- The City joined the **East Bay Community Energy** (EBCE) community choice aggregation program to increase the proportion of clean, renewable resources in the electricity mix: The EBCE program will be available to ratepayers in 2021. (ER3-3)

Actions Still in Progress :

- *Continue to implement and improve the City's existing Green Building Ordinance (GBO) for commercial and residential buildings (EC1-1)*: CALGreen and GBO are implemented on an on-going basis. New requirements for shade trees, cool roofs, and landscape lighting are being addressed through updates of CALGreen.
- *Participate in Energy Upgrade California (EC2-4):* The City participated in this program in when funding was available, and when funding was no longer available the City stopped promoting the program. However, the City partners with California Youth Energy who provides free energy and water conservation audits for residents.

Energy

Actions Still in Progress (continued):

- *Promote and increase awareness of available federal rebates and tax credits for energy efficiency upgrades (EC3-2):* Public engagement and education programs were offered from 2010-2013, since then, they have been deferred or offered on a limited basis.
- *Implement a voluntary program that promotes energy and water-efficiency upgrades of existing buildings (EC4-2):* Water-Efficiency Programs are in place, however, there are no current programs offered in energy-efficiency.
- *Implement a city-wide tree planting program, with a focus on shade trees (EC4-3):* On an ongoing basis, the City plants trees in public places including medians, planter strips, and public parks. The City is developing a way to have specific metrics for monitoring.
- *Eliminate energy demand, where feasible at municipal buildings (EG1-1):* Lighting at the Library was upgraded, and numerous city buildings made changes to HVAC systems and completed energy audits.
- *Replace all fluorescent bulbs in illuminated street name signs with more energy efficient systems (e.g. LEDs) (EG1-2):* City in year three of five-year program.
- *Upgrade streetlights, where feasible (EG1-3):* An LED Street Light Retrofit Project was completed in 2013 and a feasibility study to retrofit or convert the remaining decorative, parking lot and pathway lights to more energy efficient lighting solutions has been proposed.
- *Assess opportunities to eliminate energy demand and improve energy efficiency of municipal water/sewer system equipment (EG1-4):* The City of Pleasanton completed energy efficiency upgrades on 41% of the municipal water/sewer system pumps.
- *Assist area schools with energy audits and improve the energy efficiency of school facilities (EG1-5):* The Go Green Initiative has benchmarked all PUSD schools and the District Office, as well as 23 City Facilities. The facilities energy use is tracked through the Energy Star Portfolio Manager tool; however, no schools have completed their application for Energy Star Certifications.
- *Adopt local zoning ordinances that encourage residential renewable energy installations (e.g., wind turbines) (ER1-1):* Permits for roof mounted solar panels are reviewed online or over the counter. This measure is on current CAP checklist for private development projects; however, the City does not get enough wind to warrant wind turbine ordinance.
- *Evaluate existing installed renewable energy capacity for municipal operations and set future installed goal (ER3-1):* Energy use is evaluation annually and reported on as part of the City's two-year budget performance measures.
- *Evaluate the feasibility of installing solar (PV) panels or vertical wind turbines at City-owned facilities (ER3-2):* Panels have been installed at various buildings; other facilities are being considered for solar panel installation.

Actions Not Yet Started:

- *Modify municipal code to reduce heat island effects in the City (EC1-3):* A code amendment has not been completed. However, this measure is on the CAP checklist for development projects.
- *PG&E Partnership Program (EC2-1):* A multi-year integrated resource strategy that incorporates PG&E's Core and other pertinent programs has not been implemented.
- *Assess feasibility of establishing a revolving loan fund for home performance audits and system upgrade (EC3-1):* A revolving loan fund has not been established.
- *Promote the use of solar tubes, skylights and other daylighting systems (EC4-4):* Not implemented.

Energy

Actions Not Yet Started (continued):

- *Consider Home Energy Ratings System scores and fostering recognition of buildings that complete a prescriptive package of actions (EC4-5):* Not implemented.
- *Evaluate existing installed renewable energy capacity in community and set future community goal (ER2-1):* Not implemented.
- *Solar Cities Program (Solar City Program) (ER2-2):* Program has ended.
- *Increase promotion (rebates, education and outreach, demonstration projects) of distributed generation (ER2-3):* This measure is on current CAP checklist for private development projects.
- *Consider installing neighborhood solar grids for EV charging stations (ER2-5):* This measure is on current CAP checklist for private development projects.

Community Engagement

Community Engagement		
Focus area status: EXCELLENT		
35% of actions are **COMPLETE**	40% of actions are **IN PROGRESS**	25% of actions have **NOT STARTED**

Goals:

- Provide information and resources to the community.
- Partner with schools to promote sustainability efforts.
- Implement outreach programs for local businesses and residents.

Key Achievements:

- Implemented the **Buy Local Campaign,** as well as various partnerships and campaigns with Visit Tri-Valley and the Pleasanton Downtown Association. (PE1-7)
- Operations Services and Economic Development are members of the **Alameda County Green Business Program** and works with PG&E and area organizations to recognize exemplary green buildings and individuals that save energy. (PE1-8, PE3-2)
- The City participated in **Sustainability Circles,** a comprehensive 6-month peer-learning program that embeds sustainable practices across your organization and improves the way business is conducted. (PE2-3)
- The City adopted and conducted outreach for a **Reusable Bag Ordinance**, eliminating the use of plastic bags. (PE3-3)
- The **StopWaste** program offers educational modules free of charge and the **Go Green Initiative Local Leaders of the 21st Century** provides education and outreach to high school students. (PE2-2)
- Partnered with **California Youth Energy Services** which focuses on environmental and economic sustainability for the community. (PE3-7)

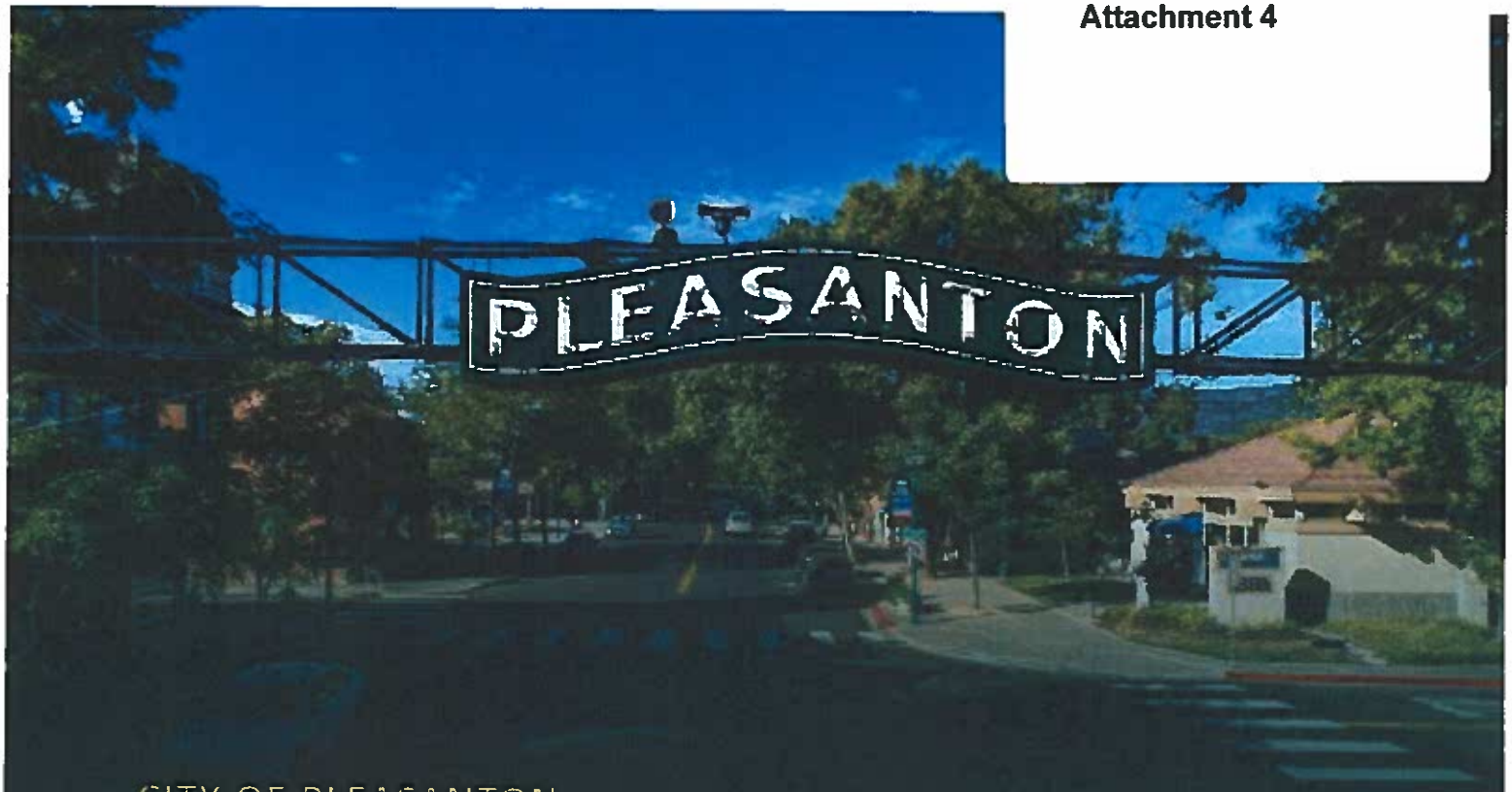
Actions Still in Progress:

- *Develop user-friendly fact sheets and provide community workshops for residents, and/or landlords to help reduce GHG emissions through water and energy efficiencies (PE1-4):* Water Conservation Program distributes water-saving educational factsheets and holds workshops, but energy and waste factsheets have not been developed.
- *Develop and implement financial aid programs for residential and commercial energy efficiency upgrades/retrofits (PE3-5):* The EEC is exploring additional funding options to encourage property owners to finance renewable energy, energy efficiency, and water conservation home improvement projects.
- *Raise awareness about the City's large-scale residential program to retrofit homes with energy efficiency measures (PE3-6):* Initiated upon the completion of the Climate Action Plan but has not been promoted since due to insufficient funding.
- *Continue to host free community events, sustainability lectures and various workshops (PE3-8):* Ongoing through the Water Conservation Program.

Actions Not Yet Started:

- *Identify and empower neighborhood and community champions on climate change and sustainability (PE1-6):* Not implemented.
- *Promote community climate action planning through schools; send information home through schools (PE2-1).* Not implemented.

Attachment 4



CITY OF PLEASANTON

CLIMATE VULNERABILITY ASSESSMENT

CASCADIA CONSULTING GROUP

MAY 2020

CASCADIA CONSULTING GROUP

Table of Contents

Assessment Overview

Goals

The City of Pleasanton is currently updating its 2012 Climate Action Plan.[1] As part of this process, the City is assessing its climate vulnerability. The climate vulnerability assessment is intended to support the City in:

- Anticipating future climate change impacts.
- Assessing the exposure, sensitivity, and adaptive capacity of various sectors and communities to future climate change impacts and conditions.
- Identifying actions to address and minimize climate risk within the Climate Action Plan update, including actions that bring both climate mitigation and adaptation co-benefits.

Climate Vulnerability, Resilience, and COVID-19

As Pleasanton and the rest of the world continue to respond to the COVID-19 pandemic, it is more important now than ever to understand climate vulnerability through the lens of public health, health and emergency responses, quality of life, and those who are disproportionately impacted. The investments we make today in both our understanding and capacity to respond to climate change and public health crises will allow Pleasanton to shape what the world will look like, not just for current residents and visitors, but for our children, grandchildren, and all future generations.

- **Some of our community members are more vulnerable to the impacts we expect to see due to climate change**, including children, older populations, people with chronic health conditions, low-income households, and communities of color. We now know that many of these groups that are vulnerable to climate change are also at higher risks of adverse health effects from COVID-19. Assessing vulnerability and taking climate action could help reduce additional burdens for these groups.

- **Assessing climate vulnerability can build resilience to a broad range of crises and hazards, including natural disasters, water shortages, and public health crises**—all of which are expected to increase as a result of climate change. Impacts from public health crises, like the COVID-19 pandemic, have shown how public health risks can threaten the functioning of a society and an economy. Understanding the intersection of climate risks and public health risks can strengthen the capacity to respond during these crises.

- **Some of the most cost-effective strategies for increasing resiliency and preparing for pandemics consists of investing in essential public health infrastructure**, including water and sanitation systems; increasing community awareness and education; increasing emergency response systems.[2] To prepare for and respond to a pandemic requires a degree of resources, capacities, and strategies that is on par with what is needed to handle emergencies driven by climate change impacts, such as wildfire and flooding.

- **By coordinating planning efforts, multiple economic challenges generated by crises from climate change and other drivers can be addresses simultaneously**, like higher energy bills for more air conditioning, higher food costs from lower crop yields, higher medical bills as a result of more severe public health crises, and more resource shortages (e.g., food, water, and essential medical supplies). Taking action on climate change can help lessen these economic challenges and diversify how and where we obtain resources.

[1] See: http://www.cityofpleasantonca.gov/gov/depts/os/env/energy_and_sustainability.asp

[2] Madhav et al. 2017. Chapter 17, Pandemics: Risks, Impacts, and Mitigation. *Disease Control Priorities: Improving Health and Reducing Poverty.* https://www.ncbi.nlm.nih.gov/books/NBK525302/.

Summary of Data Sources

In conducting this vulnerability assessment, we utilized a variety of reports and publications that are locally relevant and applicable. Below, we document the primary sources consulted for the climate vulnerability assessment. These primary sources were bolstered by peer-reviewed publications and other relevant reports and assessments, as necessary and relevant.

Table 1. Summary of Data Sources.

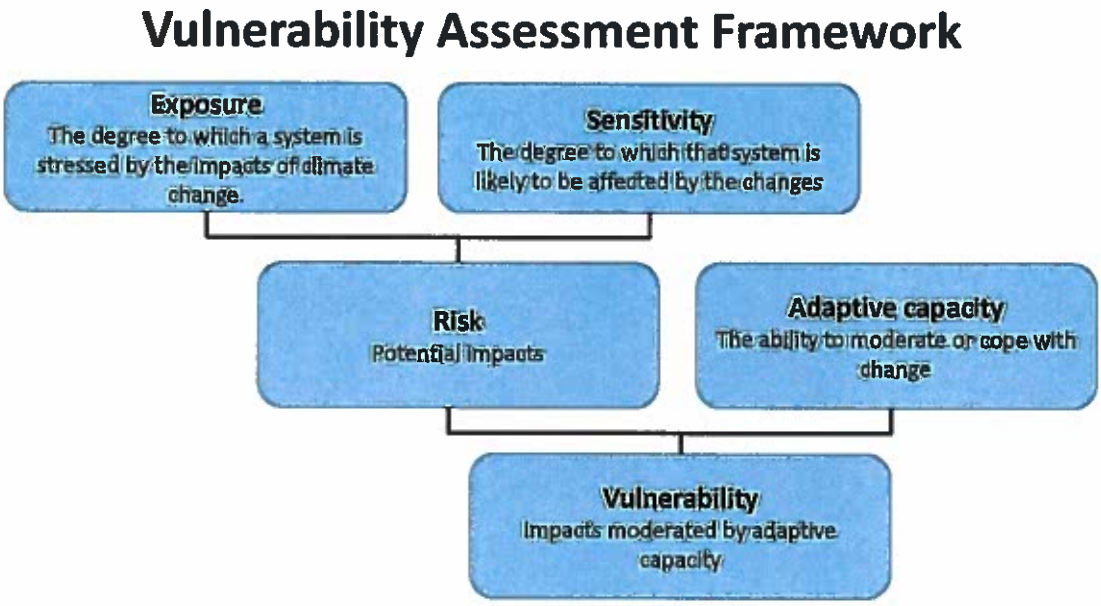
Publication or Report	Year Published	Geographic Scope
Pleasanton Climate Action Plan 1.0	2012	Pleasanton
Tri-Valley Local Hazard Mitigation Plan	2018	Tri-Valley region
Climate Change and Health Profile Report: Alameda County	2017	Alameda County
Pleasanton General Plan	2009	Pleasanton
San Francisco Bay Area Assessment, California's Fourth Climate Change Assessment	2018	San Francisco Bay Area Region
Southwest, U.S. 4th National Climate Assessment	2018	U.S. Southwest Region (CA, NV, UT, CO, NM, AZ)

Climate vulnerability framework

The Intergovernmental Panel on Climate Change defines vulnerability as a factor of exposure, sensitivity, and adaptive capacity (Figure 1).

- **Climate impacts** are the range of potential impacts a system would be affected by climate change and is dependent on exposure and sensitivity.
- **Exposure** is the degree to which a system is stressed by the impacts of climate change.
- **Sensitivity** is the degree to which that system is likely to be affected by climate change.
- **Adaptive capacity** is the ability to moderate, cope, or adapt to climate change.

Figure 1. Vulnerability Assessment Framework. Figure adapted from Adger 2006 by Cascadia Consulting Group.[3]

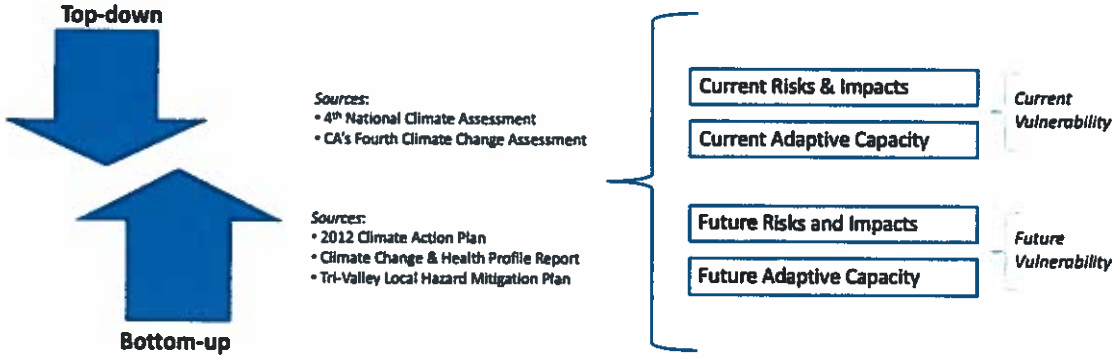


Building from this framework, we utilized a combination of a "top-down" and a "bottom-up" approach to assess vulnerability. A **top-down approach** utilizes quantitative climate models to project future biophysical climate impacts and conditions, such as warming temperatures, shifting precipitation patterns, and changes to habitat and water systems. Most vulnerability assessments utilize this top-down approach because it explicitly explores and quantifies the cause-effect relationships between global climate drivers and downscaled biophysical impacts. However, this approach does not focus on socioeconomic systems and may intrinsically contain uncertainties. A **bottom-up approach** examines the conditions and determinants of climate vulnerability for social systems and communities, such as climate impacts to infrastructure, public health, and ability of communities to respond and adapt to future climate conditions. The strength of this approach is that vulnerability is considered within the spectrum of local and place-specific conditions and realities, though this process often is limited by data availability at appropriate scales.

Combining both approaches for the City's vulnerability assessment allows us to accurately project future biophysical climate impacts while accounting for how these climate impacts will affect Pleasanton's social and economic systems and communities (Figure 2).

[3] Adger (2006). Vulnerability

Figure 2. Tailored Framework for Pleasanton's Vulnerability Assessment.



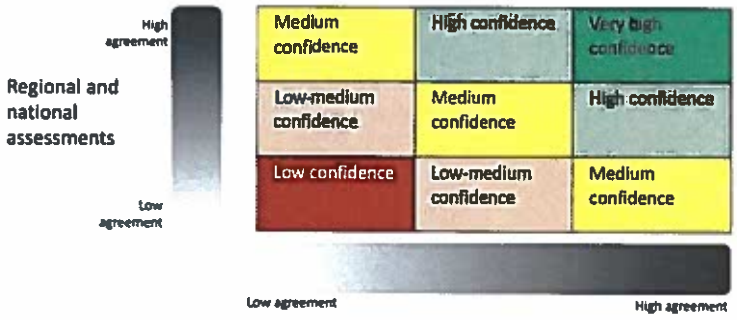
Likelihood and Confidence Framework

Within this climate vulnerability assessment, we will utilize the definitions that has been standardized within the international climate science community when describing the likelihood and confidence of future climate risks and conditions.[4] The usage of these definitions support decision-makers when considering uncertainty in the decision-making process. "Likelihood" is the quantitative or qualitative probability of a certain outcome or event to happen. "Confidence" is the degree of agreement within the evidence base that a certain outcome or event will happen in a locality. For this vulnerability assessment, we have also embedded a local relevance component within our definition of confidence (Table 2, Figure 3).

Table 2. Likelihood Scale.

Term	Probability of Outcome
Virtually certain	99 to 100% probability
Very likely	90 to 100% probability
Likely	66 to 100% probability
About as likely as not	33 to 66% probability
Unlikely	0 to 33% probability
Very unlikely	0-10% probability
Exceptionally unlikely	0-1% probability

Figure 3. Confidence Scale.



[4] Mastrandea, M.D., C.B. Field, T.F. Stocker, O. Edenhofer, K.L. Ebi, D.J. Frame, H. Held, E. Kriegler, K.J. Mach, P.R. Matschoss, G.K. Plattner, G.W. Yohe, and F.W. Zwiers. (2010). Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties. *Intergovernmental Panel on Climate Change (IPCC).* https://www.ipcc.ch/site/assets/uploads/2017/08/AR5_Uncertainty_Guidance_Note.pdf.

How to Read This Document

This assessment includes the following sections:

Climate Science Primer	A high-level overview of climate science and the climate scenarios used within this vulnerability assessment.
Climate Impacts Overview	Overview of specific biophysical impacts of climate change, which include: warmer temperatures and drought conditions; precipitation, snowpack, and water uncertainty; extreme weather events; and wildfires.
Vulnerability Assessment	Climate vulnerability of specific focus areas:
Energy and Public Infrastructure	Pleasanton's built environment and energy infrastructure.
Land Use and Transportation	Pleasanton's land use and transportation systems.
Water Management	Pleasanton's water supply and water-related (e.g., potable water, wastewater, stormwater) infrastructure.
Natural Systems and Biodiversity	Pleasanton's natural habitats, wildlife, and agriculture.
Public Health	Mental health, physical health, and Pleasanton's public health systems.

Each focus area (e.g., Energy and Public Infrastructure) is meant to be a stand-alone document. Within each focus area of this vulnerability assessment, there will be further analysis of climate risk and adaptive capacity for different components of a focus area. Below is an example of this analysis:

Water Supply and Availability – High Vulnerability

Climate Impacts	High
Adaptive Capacity	Moderate
Climate Vulnerability	High

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Earlier melting of snowpack, seawater intrusion into groundwater, runoff/pollutant intrusion into groundwater, increased rates of evapotranspiration, and levee failures may contaminate Bay Area water supplies. This could lead to lack of potable water for the greater Bay Area. Future impacts to snowpack and precipitation changes will increase the water deficit, especially in the summer, and lead to increased water releases from storage due to mismatch of water demand and supply. Less snowpack will also very likely stress existing reservoirs, impact surface water supply, imported water, and water transfer availability.[1] Drought frequency will likely increase and last longer.[2,3]	City of Pleasanton Utilities Division purchases 80% of water from Zone 7 Water Agency and 20% from local groundwater pumped from City-owned wells. Droughts will have significant economic impacts (agriculture, water-related businesses), environmental impacts, and social impacts (health, safety, sense of place).[4] Zone 7 supplies Pleasanton with water from State Water Project (which gets water from the Sacramento-San Joaquin Delta via California Aqueduct and conveys to Tri-Valley area via the South Bay Aqueduct); surface runoff from Del Valle Reservoir, and local groundwater.[5]	Zone 7 Water Agency has its Water Management Plan that has contingency plans for droughts. CA also has the California Drought Contingency Plan. City of Pleasanton also has prepared for water supply interruptions and water shortage contingency plans.[6] Self-sufficient water systems account for about 2/3 of water systems in the Bay Area. These systems have less resources to adapt if water levels are too low. These systems are often managed for short-term coping (e.g. less watering of gardens/outdoor water restrictions), rather than substantial transformational investments.[7]

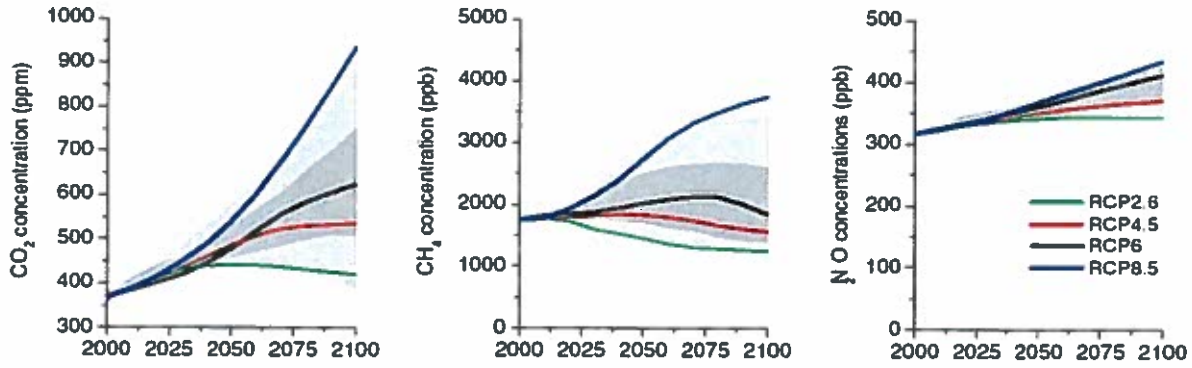
Climate Science Primer

Climate change is long-term environmental changes and changes in extreme weather conditions. Human activities, especially activities that emit greenhouse gases (GHGs), is the primary driver of global climate change.[5] Increasing GHG emissions, especially carbon emissions, has largely driven the warming of land and ocean temperatures, which has led to multiple cascading biophysical impacts.[6] Natural feedback processes, such as the El Niño-Southern Oscillation and the Pacific Decadal Oscillation, account for interannual and interdecadal variability of air temperature, extreme weather events, precipitation, and ocean conditions.[7] Despite this natural variability, the rate of climate change from human activities is far exceeding any natural climate variability from feedback processes, resulting in a global net warming of lands and waters.

The global increase in air, land, and ocean temperatures has driven ecosystems to drastically change. Globally, climate change has led to increasing temperatures, melting glaciers, sea level rise, ocean acidification, diminishing snow cover, increasing intensity of extreme storms, increasing frequency of extreme heat and cold waves, increasing frequency and intensity of fires, and shifting precipitation regimes.[8,9]

Future climate change projections will be dependent on multiple factors such as level of future greenhouse gas emissions, carbon mitigation policies, climate adaptation strategies, global growth, and socioeconomic conditions. Considering these factors, a range of different climate scenarios, called Representative Concentration Pathways (RCPs), are used to illustrate the potential future climate impacts and changes. Four main scenarios emerged: RCP2.6, RCP4.5, RCP6.0, and RCP8.5. These scenarios range from a highly ambitious reduction of global GHG emissions (RCP2.6) to a "business-as-usual" scenario (RCP8.5) (Figure 4). For the purposes of this report, we will mainly use the RCP4.5 and RCP8.5 scenarios. The **RCP4.5 scenario** is often considered a **low-emissions scenario** with coordinated reduction of global GHGs.[10] The **RCP8.5 scenario** is often considered a **high-emissions scenario** or a scenario if we conduct business-as-usual scenario without coordinated reduction of GHGs.[11] The differential between RCP4.5 and RCP8.5 projections can highlight the benefit of mitigation.

Figure 4. GHG concentrations by RCP and greenhouse gas type: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).[12]



[5] U.S. Global Change Research Program (USGCRP). (2017). *Climate Science Special Report: Fourth National Climate Assessment, Volume I*. U.S. Global Change Research Program, Washington, DC, USA, 470 pp. https://science2017.globalchange.gov/.

[6] IPCC. (2014). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC, Geneva, Switzerland, 151 pp. https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf.

[7] USGCRP (2017). Climate Science Special Report: Fourth National Climate Assessment, Volume I.

[8] Wuebbles et al. (2017). Executive summary. In *Climate Science Special Report: Fourth National Climate Assessment, Volume I*. U.S. Global Change Research Program, Washington, DC, USA, pp. 12-34. https://science2017.globalchange.gov/downloads/CSSR_Executive_Summary.pdf.

[9] IPCC (2014). Climate Change 2014: Synthesis Report.

[10] Thomson et al. (2011). RCP4.5: A pathway for stabilization of radiative forcing by 2100. *Climatic Change*. 109(77): doi.org/10.1007/s10584-011-0151-4.

[11] Riahi, K. et al. (2011). RCP8.5: A scenario of comparatively high greenhouse gas emissions. *Climatic Change*. 109: 33. https://doi.org/10.1007/s10584-011-0149-y.

[12] van Vuuren, D.P., J. Edmonds, M. Kainuma, K. Riahi, A. Thomson, K. Hibbard, G.C. Hurtt, T. Kram, V. Krey, J.F. Lamarque, T. Masui, M. Meinshausen, N. Nakicenovic, S.J. Smith, and S.K. Rose. (2011). The representative concentration pathways: an overview. *Climatic Change*. 109(5): https://doi.org/10.1007/s10584-011-0148-z.

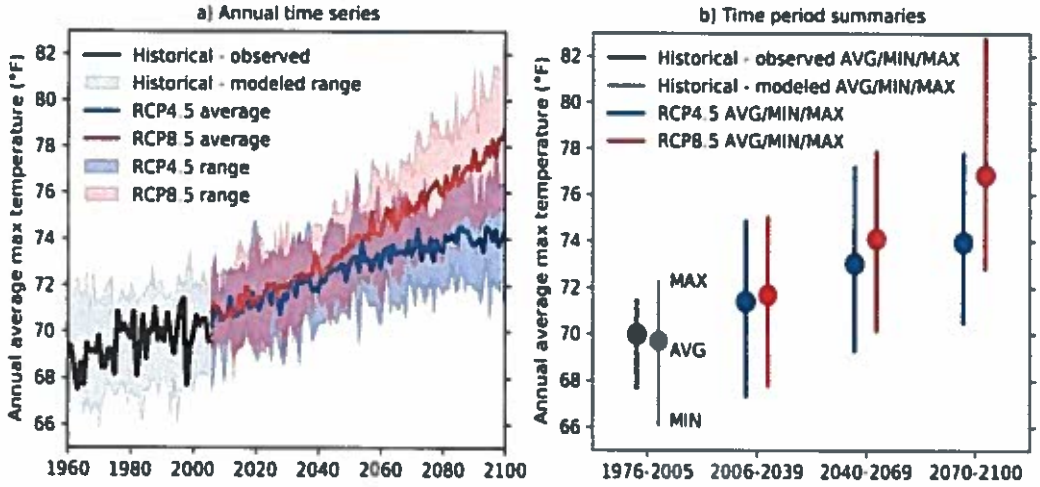
Climate Impacts Overview

Warmer Temperatures and Drought Conditions

Across the entire Bay Area, the average annual maximum temperature **has already increased by 1.7°F** between 1950 and 2005. Even with significant global reductions in greenhouse gas (GHG) emissions, the Bay Area **will continue to substantially warm**, with inland regions projected to warm more than coastal areas (Figure 5). The differential between RCP4.5 and RCP8.5 highlights the benefit in reducing GHG emissions (Figure 5b).[13]

Downscaled climate models confirm that these same regional trends are also true for Pleasanton. Using downscaled data from Cal-Adapt—an online data and data visualization tool that is used by the State of California's scientific and research community that synthesizes the most up-to-date climate models and impacts—average maximum temperatures from June to August will increase by 3.4°F and 6.0°F by the end of the century under RCP4.5 and RCP8.5, respectively (Figure 6). Furthermore, Pleasanton also experiences extreme heat days, with some days having temperatures that surpass 100°F. Future projected warming for Pleasanton is correlated with drier conditions, drought risks, and wildfire risks.[14] We can subsequently conclude with *high confidence* that future wildfire and drought risk for Pleasanton, and the broader Tri-Valley area, will increase over time by the end of the century due to climate change.[15,16]

Figure 5. Observed historical (black), modeled historical (grey), and projected future (RCP4.5 – blue, RCP8.5 – red) annual average maximum temperature over the Bay Area. (a) Annual time series of data (future projections begin in 2006), with solid lines representing observed annual mean in the historical period and model-averages in the future. Shading represents the spread across models. (b) Summary of multi-year average (circles) and spread (vertical lines) over four time periods: 1975-2005 (historical), 2006-2039 (early-21st century), 2040-2069 (mid-21st century), and 2070-2099 (late-21st century). Note that the spread of values in panel b is smaller for the observed historical data compared to both the modeled historical data and modeled future data because the modeled quantities reflect model-to-model variability in addition to year-to-year variability, whereas the observed historical data only reflects year-to-year variability. Units are in °F. Source: Ackerly et al. 2018.



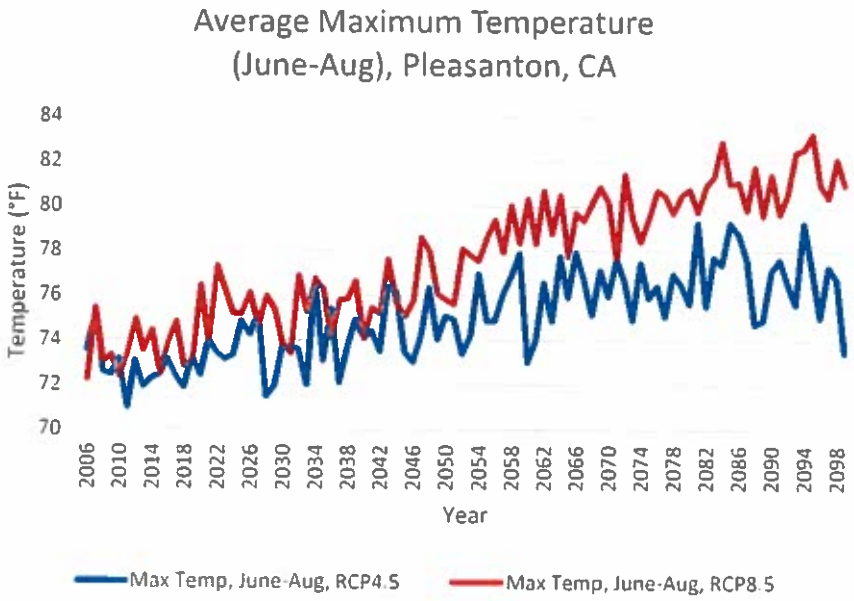
[13] Ackerly, D., A. Jones, M. Stacey, and B. Riordan. (2018). San Francisco Bay Area Summary. *California's Fourth Climate Change Assessment*. University of California, Berkeley. Publication number: CCCA4-SUM-2018-005. https://www.energy.ca.gov/sites/default/files/2019-07/Reg%20Report-%20SUM-CCCA4-2018-005%20SanFranciscoBayArea.pdf.

[14] Ackerly et al. (2018). San Francisco Bay Area Summary.

[15] Ackerly et al. (2018). San Francisco Bay Area Summary.

[16] Tetra Tech. (2018). Tri-Valley Local Hazard Mitigation Plan. Prepared for City of Dublin, City of Livermore, and City of Pleasanton. Project #103S4859. https://www.dsrsd.com/home/showdocument?id=5581.

Figure 6. Average maximum temperature (June-August), for Pleasanton, CA. Original data from Cal-Adapt utilizing the HadGEM2-ES model, used in the California's Fourth Climate Change Assessment. Figure developed by Cascadia Consulting Group.



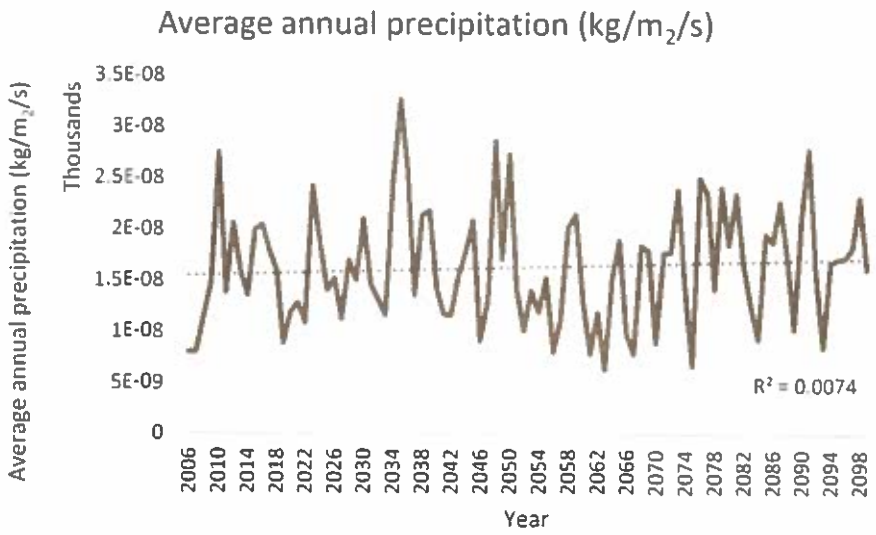
Warmer temperatures and drought conditions can in turn affect future energy demand, infrastructure corrosion and maintenance, natural habitat conditions and suitability, water supply and quality, and heat-related illnesses. However, specific tools and strategies can help mitigate future temperature-related climate impacts. For example, forward-thinking land use planning can mitigate some heat effects (e.g. urban heat island), shade from trees or restoring vegetation in green infrastructure can mitigate future cooling energy demand, and resilient ecosystems can enhance water retention and water quality.

Precipitation, Snowpack, and Water Uncertainty

There is **high year-to-year variability** in the average annual precipitation for Pleasanton and the Bay Area (Figure 7).[17] This variability is informed by many biophysical processes, including local climate factors and atmospheric circulation patterns. Due to this variability, it is *difficult to confidently* project year-to-year precipitation averages in the Bay Area, though it is *very likely* that snowpack in the region will decline significantly.

[17] Ackerly et al. (2018). San Francisco Bay Area Summary.

Figure 7. Average annual rainfall (kg/m2/s), for Pleasanton, CA. Original data from Cal-Adapt utilizing the HadGEM2-ES model, used in the California's Fourth Climate Change Assessment. Figure developed by Cascadia Consulting Group.

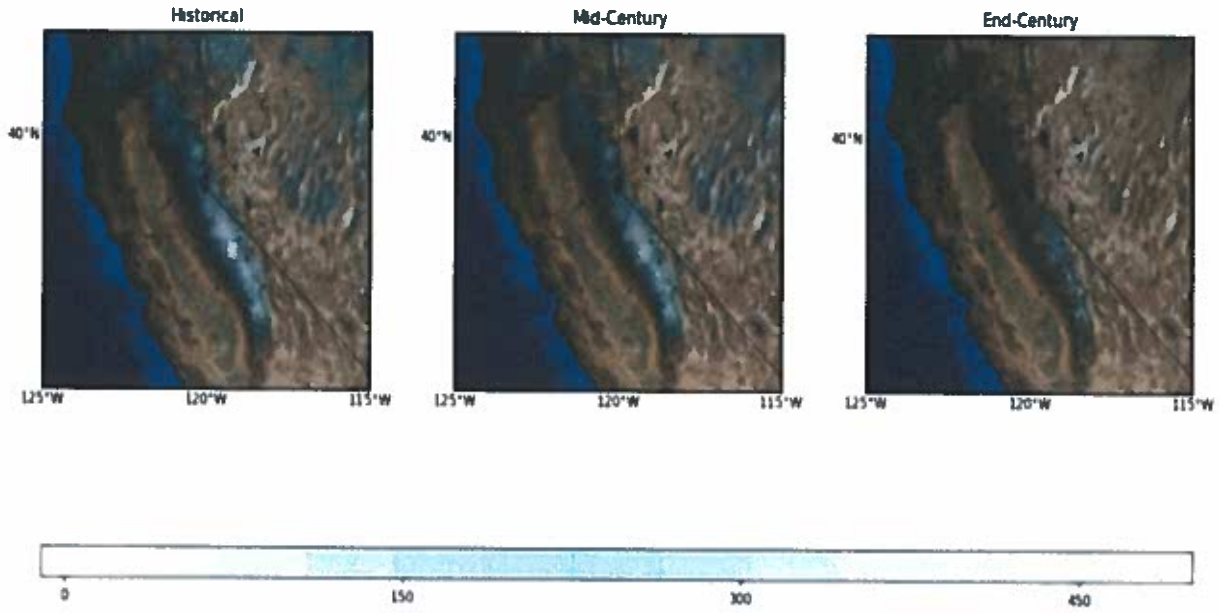


Despite this variability in average annual precipitation, there are other climate impacts related to snowpack and precipitation that will affect Pleasanton. Winter storms will likely become more intense and cause more damage from heavy rainfall and flooding in the coming decades. Furthermore, under RCP8.5, snowpack is projected to decline by 20% in the next 20-30 years, 60% by mid-century, and 80% by end of the century (Figure 8).[18]

Future impacts to precipitation patterns, snowpack, and water availability will have far-reaching consequences across multiple sectors. Changes in seasonal streamflow and timing will *likely* alter hydropower supply for the region which may lead to a mismatch in future energy demand and supply. Seasonal precipitation shifts will affect natural ecosystems and available water supply for human use. Inundation from extreme precipitation may facilitate water-borne disease transmission and future water scarcity will *likely* compound public health risks and disparities. However, there are multiple strategies that may alleviate specific climate risks. For example, investments in water infrastructure and management will alleviate future risks from water scarcity and extreme precipitation, increasing the redundancy of the energy grid infrastructure will *very likely* promote year-round energy security, and enhancing natural habitats can promote water security.

[18] Ackerly et al. (2018). San Francisco Bay Area Summary.

Figure 8. Future snowpack projections for California Sierra Nevada. The figure highlights a new variable-resolution global climate model simulation of average winter snowpack in the California Sierra Nevada over a historical period (left), at mid-century (middle), and at the end of the century (right) under a business-as-usual emission scenario (RCP8.5). Units are mm of snow water equivalent (SWE) averaged over the winter months of December, January, and February. Source: Adapted from Figure 8.2 in the 4th National Climate Assessment by Hari Krishnan at Lawrence Berkeley National Laboratory.



Extreme Weather Events

Atmospheric rivers, or long and narrow regions of the atmosphere that transport large volumes of water vapor from tropical regions (as much as 7 to 15 times the volume of the Mississippi River), cause heavy rainfall and contribute approximately 40% of the annual snowpack in the state. In the Russian River basin and the Sierra Nevada region, atmospheric rivers represent only 17% of all precipitation events, yet account for over 50% of all annual precipitation. Thus, despite annual precipitation averages declining under future climate conditions, multiple climate models project that **extreme precipitation events are *very likely* to increase in magnitude and frequency** (Figure 9). In other words, rain events will be less frequent but will be more intense when they do happen. These future extreme precipitation events are of particular concern to Pleasanton because they are correlated to extreme flooding events and damaging and dangerous shallow landslides in the Bay Area (*high confidence*).[19,20] This risk is especially of concern in fall and winter months because of the higher frequency of atmospheric rivers.[21] Furthermore, the risks of landslides or mudslides from heavy precipitation events is multiplied in a post-wildfire landscape due to cumulative impacts to slope stability and soil moisture.[22]

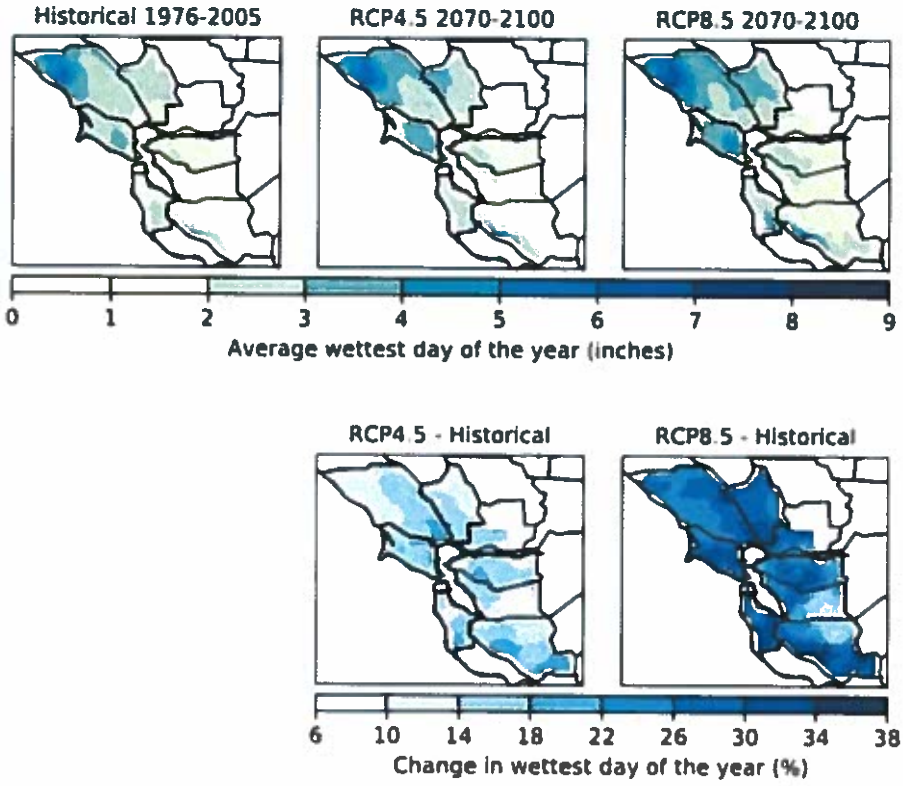
[19] Ackerly et al. (2018). San Francisco Bay Area Summary.

[20] Cordeira, J.M. (2019). A 142-Year Climatology of Northern California Landslides and Atmospheric Rivers. *Bulletin of the American Meteorological Society*. DOI:10.1175/BAMS-D-18-0518.1.

[21] Oakley, N.S., J.T. Lancaster, B.J. Hatchett, J. Stock, F.M. Ralph, S. Roj, and S. Lukashov. (2018). A 22-Year Climatology of Cool Season Hourly Precipitation Thresholds Conducive to Shallow Landslides in California. *Earth Interactions*. 22(1): DOI:10.1175/EI-D-17-0029.1.

[22] Cannon, S.H. and J.E. Gartner. (2005). Ch. 15 Wildfire-related debris flow from a hazards perspective. In: *Debris-flow Hazards and Related Phenomena* [eds. M. Jakob and O. Hungr]. Springer Praxis Books. Springer, Berlin, Heidelberg.

Figure 9. Average wettest days and percent change. Top row shows the average wettest day of the year in the historical (1976-2005) period and in the late-21st century (2070-2100) under RCP4.5 and RCP8.5. Units are in inches. Bottom row shows the percent change between late-21st century and historical conditions for the wettest day of the year. All data are derived from LOCA.



Extreme rainfall and weather events will have acute and significant damage to Pleasanton's social systems and public infrastructure. Precipitation extremes may exacerbate existing transportation infrastructure vulnerabilities by flooding low-lying routes. Extreme weather events will likely cause short-term disruption to support services and long-term damage to City infrastructure. Disruption of services, even for a short period, is very likely to have public health consequences for those unable to access health and emergency services. Investing in ecosystem and habitat functions may mitigate future extreme weather impacts by creating natural floodplains.

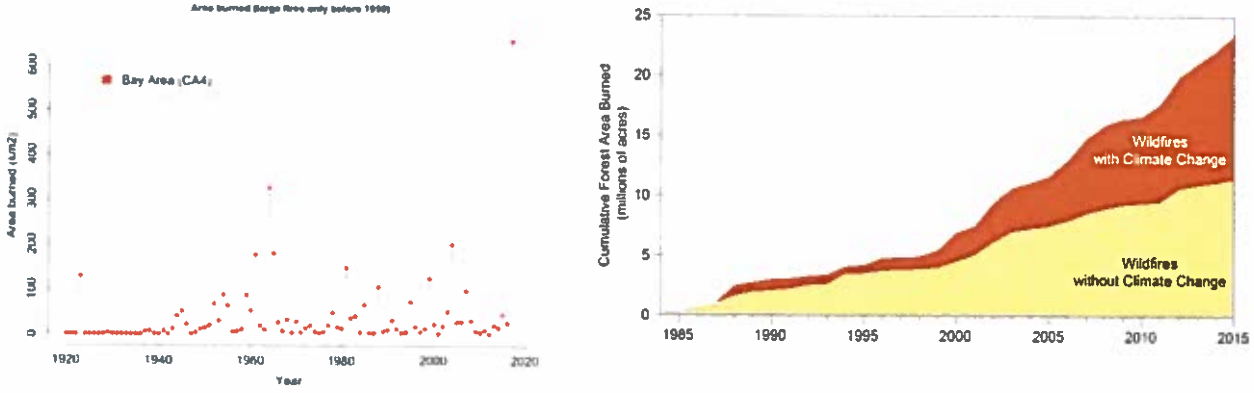
Wildfires

The Bay Area is already fire-prone landscape, regardless of future climate change. Across the Bay Area and the western U.S., wildfires have been increasing in intensity, especially the destructive fire seasons of 2015 and 2017 in the Bay Area and the North Coast. Within the Tri-Valley area, there has been additional smaller wildfires associated with drought conditions (Table 3).

Table 3. Destructive wildfires in the Bay Area and Tri-Valley region. Bay Area fires ranked in the top 20 most destructive fires in California history, in terms of structures burned (Source: CalFire) and fires over 10 acres in recent years that have burned in the Tri-Valley area. There is a "-" when no data is available. Source: CalFire, adapted in the Tri-Valley Local Hazard Mitigation Plan.

Rank	Fire	Date	County or Location	Acres burned	Structures damaged	Deaths
1	Tubbs	October 2017	Sonoma	36,807	5,643	22
2	Tunnel	October 1991	Alameda	1,600	2,900	25
4	Valley	September 2015	Lake, Napa, Sonoma	76,067	1,955	4
6	Nuns	October 2017	Sonoma	54,382	1,355	2
11	Atlas	October 2017	Napa, Solano	51,624	781	6
15	Berkeley	September 1923	Alameda	130	584	0
-	-	August 2015	Between Livermore and Tracy	2,700	-	-
-	-	June 2015	Southeast Livermore	53	-	-
-	-	October 2013	Livermore	150	-	-
-	Fallon	July 2013	Dublin	38	-	-
-	Vasco	June 2013	North of Livermore	240	-	-

Figure 10. Area burned in the Bay Area and western United States. Top figure shows the area burned in the Bay Area. Cumulative areas derived from FRAP (1920-2016) and GeoMac[23] (2017). Bottom figure shows the cumulative area burned in the western United States that is associated with climate change (adapted from Abatzoglou and Williams 2016 for the Southwest Chapter of the 4th National Climate Assessment).[24,25]



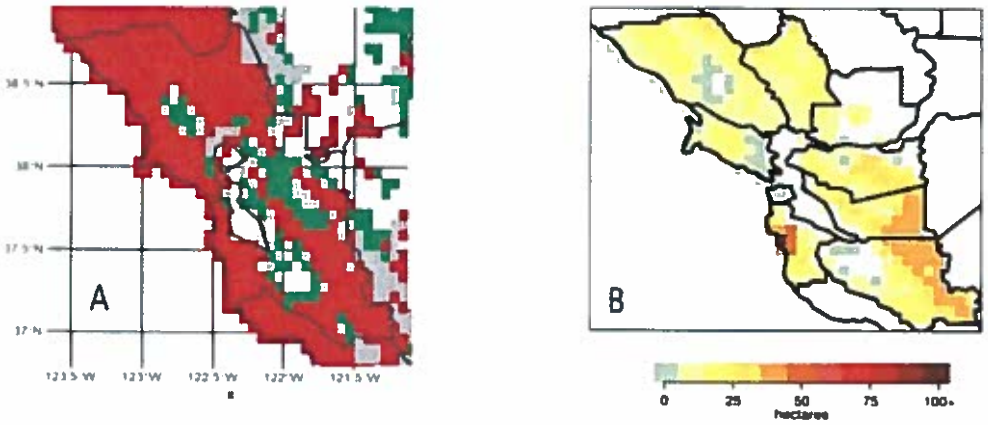
[23] Geospatial Multi-Agency Coordination (GeoMac). https://www.geomac.gov/. Accessed 3 March 2020.

[24] Abatzoglou, J.T. and A.P. Williams. (2016). Impact of anthropogenic climate change on wildfire across western U.S. forests. *Proceedings of the National Academy of Sciences of the United States of America*. 113(42): 11770-11775. Doi:10.1073/pnas.1607171113.

[25] Gonzalez, P., G.M. Garfin, D.D. Breshears, K.M. Brooks, H.E. Brown, E.H. Elias, A. Gunasekara, N. Huntly, J.K. Maldonado, N.J. Mantua, H.G. Margolis, S. McAfee, B.R. Middleton, and B.H. Udall. (2018). Southwest. In: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. [Eds. Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart]. U.S. Global Change Research Program, Washington, D.C., USA. Pp. 1101-1184. Doi: 10.7930/NCA4.2018.CH25.

However, **future wildfire risk amplification will be driven by a combination of land use and climate change**. Warmer temperatures and drier conditions combined with an expanding wildland-urban interface (WUI) will *very likely* increase inland fuel loads and lead to a significant increase of wildfire risk for parts of the inland Bay Area region (Figure 11). Although the Tri-Valley region will *likely* experience a smaller proportionate increase in wildfire risk compared to other areas of the inland Bay Area region, there will *very likely* be spillover air quality impacts from wildfire smoke (*high confidence*). Regardless of annual precipitation variability, increasing drought intensity due to low snowpack will affect the wildfire risk, the wildfire response capacity, and air quality in the region.

Figure 11. Projections for future changes in wildfire. A) Predictions for increase (red) or decrease (green) in fire frequency (2026-2050, compared to baseline of 1976-2000), showing areas of agreement across an ensemble of climate models. B) Composite projections from Westerling 2018[1] for mid-century (2035-2064) average annual area burned under RCP4.5 (results for RCP8.5 are very similar).



Although the likelihood of a wildfire in the Tri-Valley area is relatively lower than the surrounding area, a wildfire of any size is likely to damage infrastructure and disrupt transportation routes and social services to Pleasanton residents. Furthermore, any wildfires in the Bay Area region will have indirect impacts to **Pleasanton residents** even though the wildfire may be physically far away. **Every year since 2015, Pleasanton and the broader Tri-Valley area has experienced multiple days of poor air quality from regional wildfires.**[26] Air quality degradation from wildfire smoke will very likely increase smoke-related illnesses, causing acute injuries and exacerbating chronic health illnesses and conditions. Wildfire smoke may also force people to stay inside and prevent outdoor laborers from working, potentially contributing to mental health illnesses and financial insecurity. Wildfires occurring upstream is likely to increase debris and sedimentation and affect downstream water quality. Coordinated land use planning, enhancing natural habitats and natural resource management strategies, and water supply management can alleviate indirect and direct impacts from future wildfires.

[26] Examples of news stories reporting on poor air quality from wildfires in Pleasanton include: https://www.newsweek.com/california-wildfire-map-air-quality-pollution-smoke-1467757, https://abc7news.com/poor-air-quality-camp-fire-smoke-form-wildfire/4694139/, https://patch.com/california/pleasanton/smoke-pleasanton-likely-california-wildfires-0, https://pleasantonweekly.com/news/2017/10/09/poor-air-quality-in-tri-valley-from-fires-in-napa-sonoma-counties, and https://patch.com/california/danville/smoke-kincade-fire-impacting-tri-valley-air-quality.

Energy and Public Infrastructure

Extreme weather and rainfall events, changes in seasonal precipitation patterns, warmer temperatures, and wildfires and wildfire smoke will affect Pleasanton's built environment and energy operations.

LOW TO MODERATE VULNERABILITY

Energy Infrastructure

Storms and wildfires will likely cause more **frequent power outages** and **energy transmission disruptions.**

MODERATE VULNERABILITY

Energy Supply and Demand

Warmer summers will very likely **increase summer cooling demand** and loss of snowpack is likely to **decrease spring and summer hydroelectric energy supply.**

MODERATE TO HIGH VULNERABILITY

Buildings

Extreme weather events will very likely **increase flooding and landslide risk.** Secondary impacts from **wildfire smoke** is likely to affect building maintenance and operations.

LOW VULNERABILITY

Dams

Extreme storms are as likely as not to alter dam operations and cause **small design failures,** leading to **downstream flooding.** Major dam design failures are unlikely, though **catastrophic** if it occurs.

Energy Infrastructure – Low to Moderate Vulnerability

Climate Impacts	Low to Moderate
Adaptive Capacity	Moderate
Climate Vulnerability	Low to Moderate

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Extreme weather events are likely to cause damage to power lines and energy structures, leading to power outages and disruption of communication lines for Pleasanton. Regionally, flooding from extreme storms and sea level rise may damage regional natural gas distribution infrastructure. Wildfires in the broader Bay Area region, although unlikely to happen in Pleasanton, are likely to disrupt regional energy distribution which may have indirect impacts for Pleasanton residents and businesses.[1]	Estimated 10% of population will be affected by a power failure from an extreme storm. This will lead to an estimated loss of $944,773/day for electric utilities. In Pleasanton, there are 5 utility structures in the moderate fire hazard severity zones (FHSZ), 33 utility structures in the high FHSZ, and 4 utility structures in the very high FHSZ.[2] During a 100-year storm, approximately 26 miles of PG&E's natural gas pipelines will be inundated. This may disrupt natural gas distribution in the greater Bay Area region.[3]	The City has installed solar panels at multiple municipal buildings, including Operations Service Center, Police Department, Fire Station 4, and the Fire House Art Century.[4] Having alternative, self-sufficient energy sources helps businesses and people cope with climate impacts to regional energy distribution infrastructure.[5]

Public Safety Power Shutoffs

To mitigate the risks of wildfires, PG&E has implemented Public Safety Power Shutoffs (PSPS) during times of heavy winds and dry conditions, which significantly increase fire risk. These PSPS events, which could last up to several days or longer, affect daily activities, residential and commercial energy access, internet connectivity, and phone and communication lines. Investments into redundancy of the City's energy infrastructure, self-sufficient energy sources for commercial buildings, and emergency preparedness plans and kits can help all Pleasanton prepare for future planned PSPS events, emergencies, and future climate impacts. Other actions that residents can take before a PSPS event include:

- Confirm/update your contact information with PG&E
- Create a safety plan with your family (and pets!)
- Prepare an emergency supply kit
- Keep mobile phones and other devices charged
- Keep cash on hand (ATMs may not work)
- If you have a generator, make sure it's ready to operate safely
- Have flashlights and backup batteries
- Have a backup radio and tune to AM 1610 for more information
- Learn how to manually operate garage door

[1] Ackerly, D., A. Jones, M. Stacey, and B. Riordan. (2018). San Francisco Bay Area Summary Report. California's Fourth Climate Change Assessment. University of California, Berkeley. Publication number: CCCA4-SUM-2018-005.

[2] Tetra Tech. (2018). Tri-Valley Local Hazard Mitigation Plan. Prepared for City of Dublin, City of Livermore, and City of Pleasanton. Project #103S4859.

[3] Ackerly et al. (2018). San Francisco Bay Area Summary.

[4] Pleasanton CAP Progress Memo. (2020). Prepared by Cascadia Consulting Group.

[5] Ackerly et al. (2018). San Francisco Bay Area Summary.

Energy Supply and Demand – Moderate Vulnerability

Climate Impacts	Moderate
Adaptive Capacity	Low to Moderate
Climate Vulnerability	Moderate

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Warmer summer temperatures will very likely increase energy demand in the summer and decrease heating demand in the winter. The increased summer demand can overwhelm the energy grid and cause power outages.[6] For example, the heat wave in July 2006 left 1.2-5 million PG&E customers without power at some point due to the high demand for air conditioning.[7] Less snowpack and shifting precipitation patterns will likely decrease hydropower supply during summer and fall months, which may cause a mismatch of energy demand and supply.[8,9]	Bay Area energy utilities already experience sharp increases in daily energy loads, what is known as the duck curve, in the afternoon during spring and summer months. It is expected that this sharp increase will become a regular occurrence in every season by 2025.[10] Hydropower accounts for about 12% of PG&E's energy mix. Though not a predominant contributor to the energy mix, even slight decreases in the hydroelectric energy supply may affect the ability to provide sufficient energy supply during high-demand times.[11]	It is difficult to improve energy efficiency in older homes (homes built before 1969), multi-family residences, and small office buildings. Energy efficiency improvements can ameliorate energy demand.[12] PG&E's energy supply mix is 33% renewable energy, 12% hydroelectric energy, 17% natural gas, and 24% nuclear energy. Strategic investments in energy supply can increase the ability to cope with changing seasonal energy demand in the future.[13]

[6] Auggharmmer, M. (2018). Climate Adaptive Response Estimation: Short and Long Run Impacts of Climate Change on Residential Electricity and Natural Gas Consumption Using Big Data. California's Fourth Climate Change Assessment. Publication number: CCCA4-EXT-2018-005.

[7] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[8] Ackerly et al. (2018). San Francisco Bay Area Summary.

[9] Gonzalez, P., G.M. Garfin, D.D. Breshears, K.M. Brooks, H.E. Brown, E.H. Elias, A. Gunasekara, N. Huntly, J.K. Maldonado, N.J. Mantua, H.G. Margolis, S. McAfee, B.R. Middleton, and B.H. Udall. (2018). Southwest: In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*. Eds. Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycockm and B.C. Stewart. U.S. Global Change Research Program, Washington D.C., USA, pp. 1101-1184. Doi: 10.7930/NCA4.2018.CH25.

[10] Ackerly et al. (2018). San Francisco Bay Area Summary.

[11] Pacific Gas and Electric Company. (2016). PG&E Power Mix 2016.

[12] Ackerly et al. (2018). San Francisco Bay Area Summary.

[13] Pacific Gas and Electric Company. (2016). PG&E Power Mix 2016.

Buildings – Moderate to High Vulnerability

Climate Impacts	High
Adaptive Capacity	Moderate
Climate Vulnerability	Moderate to High

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Flooding may likely occur for residences and structures in or near floodplains near rivers and streams in Pleasanton. This will lead to infrastructure damage and increased maintenance and repair costs. Extreme weather events are likely to increase the likelihood of landslides.[14] Wildfire risk is very low, although secondary wildfire smoke impacts can affect building operations and maintenance.[15,16]	There are 123 structures (23 critical structures) in the 10% annual chance floodplain, worth $122 million. There are 369 structures (26 critical structures) in the 1% annual chance floodplain, worth $229 million. 100-year floods, or floods that inundate the 1% annual chance floodplain, are more likely to happen under future climate conditions. There are 2,547 structures, worth $1.9 billion, in the high landslide susceptibility areas in Pleasanton.[17]	As of 2017, there are 140 flood insurance policies through the National Flood Insurance Program that insurances approximately $51 million of structures. In Pleasanton, there has been 8 flood claims between 1978 and 2017, valuing at $154,583.37.[18]

[14] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.
[15] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.
[16] Gonzalez et al. (2018). Southwest: In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*.
[17] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.
[18] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

Dams – Low Vulnerability

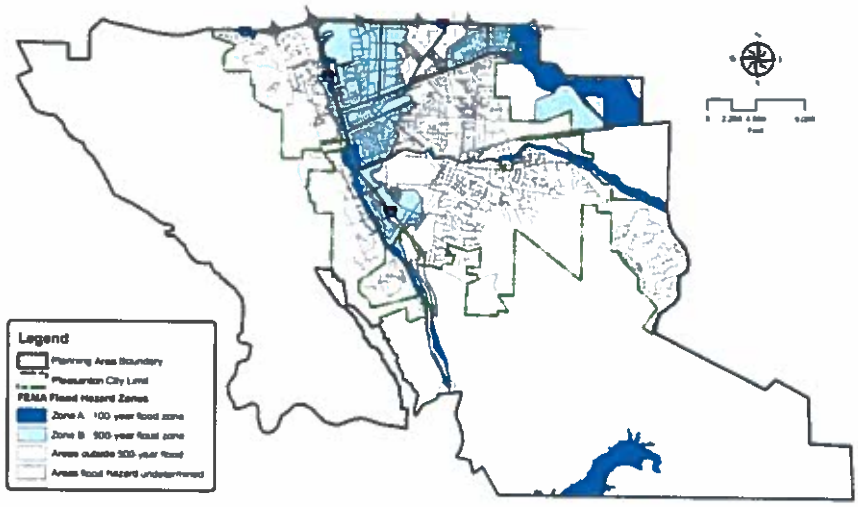
Climate Impacts	Low to Moderate
Adaptive Capacity	Moderate to High
Climate Vulnerability	Low

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Extreme rainfall events are as likely as not to cause small design failures for dams, including releasing water volumes at different times to reduce freeboard, spillway overflow events, and infrastructure damage. Releasing water during extreme weather events can compound downstream flooding risk. There is a very low likelihood of major dam design failure of happening, however, if it does happen it will be catastrophic.[19]	There are two dams in the Tri-Valley area that are classified in the high or very high hazard class (Del Valle Dam and Patterson Dam). Both dams are outside Pleasanton, but parts of Pleasanton lie within the dam failure inundation area. For the Del Valle Dam, there are 17,555 structures in the inundation area, worth $17 billion. About 57,666 people live in the inundation area, which is approximately 25.6% of the Tri-Valley area population. In the City of Pleasanton, there are 148 critical facilities located in the dam failure inundation area.[20]	For small design failures, it will be more difficult for dam operators to make judgment decisions without considering future climate impacts. Increased safety protocols and precautions may be able to mitigate runoff, flooding, sedimentation, and debris accumulation impacts during extreme weather events. Investments into infrastructure upgrades and safety precautions can prevent a catastrophic major dam failure.[21]

100-Year Floods

Areas in blue belong to the 1% annual chance (100-Year) flood zone. 100-year floods are extreme and catastrophic floods. Though called "100-year floods", these floods are happening more and more frequently.

Since 1970, there has been 12 major flood events in the Tri-Valley area, with 6 occurring in the past 15 years. These floods have led to significant building damage, stranded residents, and deaths.



[19] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.
[20] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.
[21] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

Opportunities to Enhance Climate Resilience

There are multiple ways to enhance the resilience of Pleasanton's energy and infrastructure systems. Below we outline several actions identified in various plans that can increase the capacity to adapt and cope with future climate change or mitigate risks.

Action	Sectors Addressed	Mitigate Climate Impacts	Enhance Adaptive Capacity	GHG Mitigation Potential
Proactive land use management (e.g., increase natural vegetation, impervious surface planning)	Buildings	✓	✓	✓
Improve and diversify energy sources and supply for residential units to create redundancy in energy system	Energy Infrastructure, Energy Supply and Demand		✓	✓
Dynamic energy-demand responsive lighting and heating in office buildings	Energy Supply and Demand	✓		✓
Natural hazard insurance coverage for residents and businesses	Buildings		✓	
Investments into climate-resilient infrastructure[22]	Energy Infrastructure, Buildings, and Dams	✓	✓	✓
Safety precautions and protocols to prevent major dam failures	Dams	✓	✓	

[22] Climate-resilient infrastructure refers to the suite of strategies that addresses structural design and management that improves a structure's ability to cope and mitigate impacts from climate change. Examples of climate-resilient structural design include fortifying at-risk infrastructure, adjusting height of structures (e.g., transmission lines and towers) to account for extreme events, and using stainless steel material (when applicable) to reduce corrosion from water damage. Examples of climate-resilient structural management is altering maintenance schedules, creating emergency or disaster protocols and implement drills, integrating climate models and information into energy load forecasting, and pruning trees near transmission and distribution lines.

Land Use and Transportation

Extreme storms and flooding events, warmer temperatures and heat waves, and land use will disrupt and damage transportation routes. Future climate change and land use are inextricably linked and are linked many inter-dependent sectors.

MODERATE TO HIGH VULNERABILITY

Transportation Systems

Extreme weather events, such as landslides and flooding, will cause **disruption of transportation routes and services.** Warmer temperatures are likely to **accelerate deterioration** of transportation infrastructure.

LOW VULNERABILITY

Land Use

Land use decisions can **magnify or mitigate** climate change impacts. Future land use potential may be **limited by future climate conditions** or can **enhance community resiliency to climate change.**

INTER-DEPENDENT SYSTEMS AND CLIMATE VULNERABILITY[1]

Land use and transportation systems are **inter-connected** with many other sectors vulnerable to climate change, including energy systems, development of buildable lands, water systems, and natural and managed ecosystems.

- Transportation routes support commuters, electricity and fuel delivery, and water supply delivery.
- Land use affects where development can happen, critical habitat areas, and siting of critical infrastructure sites.

In certain cases, land use decisions can **multiply climate risks and vulnerability**.

- Residential development can enhance the risk of fires spreading across a landscape.
- Conversion of natural habitat areas can enhance flooding risk and affect water quality.

Future land use decisions have the ability to ameliorate future climate impacts and mitigate GHG emissions.

- Coordinated tree planting can provide localized cooling during heat waves and provide local carbon sequestration.

[1] Ackerly, D., A. Jones, M. Stacey, and B. Riordan. (2018). San Francisco Bay Area Summary Report. California's Fourth Climate Change Assessment. University of California, Berkeley. Publication number: CCCA4-SUM-2018-005.

Transportation Systems – Moderate to High Vulnerability

Climate Impacts	High
Adaptive Capacity	Moderate
Climate Vulnerability	Moderate to High

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Though sea level rise does not affect Pleasanton specifically, the combination of sea level rise and storm surges may disrupt commute routes for people who commute into Pleasanton. Any type of flooding that occurs at critical links (e.g. infrastructure and railways) will disrupt Bay Area networks. Access and disruption to major roads can cause disruption of services, isolation of neighborhoods, traffic problems, and economic losses. Climate change is likely to create conditions that make landslides more likely.[2] Secondary hazards from extreme weather (landslides and flooding) will be felt. These can prolong transportation disruptions.[3] Warmer temperatures and heat waves are likely to lead to accelerated deterioration of pavement, railways, and bridges.[4]	I-580; I-680, West Las Positas Blvd, Santa Rita Road, 1st Street, Hopyard Road are all within the 1% annual chance floodplain. Other roads in Livermore are also in the 1% annual chance floodplain, which may affect the redundancy of transportation routes during flooding events. There are other economic impacts from transportation disruption (shipment of goods and commerce).[5] Almost 90% of Pleasanton's workforce commutes from other parts of the Bay Area.[6]	Pleasanton already has multiple transportation routes that provide redundancy in transportation options, including public transportation options, rail transportation options, and roads/highways.

[2] Ackerly et al. (2018). San Francisco Bay Area Summary.

[3] Tetra Tech. (2018). Tri-Valley Local Hazard Mitigation Plan. Prepared for City of Dublin, City of Livermore, and City of Pleasanton. Project #103S4859.

[4] Jacobs, J.M., M. Culp, L. Cattaneo, P. Chinowsky, A. Choate, S. DesRoches, S. Douglass, and R. Miller. (2018). Transportation: In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*. Eds. Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycockm and B.C. Stewart. U.S. Global Change Research Program, Washington D.C., USA, pp. 479-511. Doi: 10.7930/NCA4.2018.CH12.

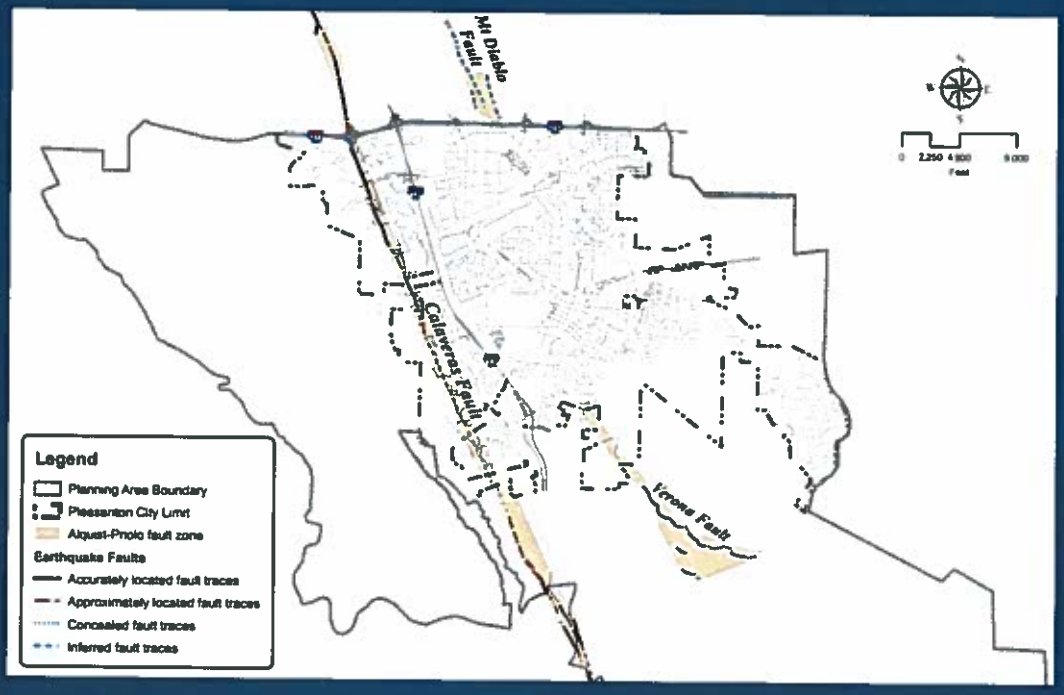
[5] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[6] City of Pleasanton. (2013). Economic Development Strategic Plan. Prepared by Strategic Economics.

Almost half of all Pleasanton workers commute from Alameda and Contra Costa Counties, with the rest commuting from other Bay Area locations or the Central Valley. About 13% of commuters come from nearby Tri-Valley cities.

Earthquakes and Climate Change Resilience

As many California residents know, threats of earthquakes are ever-present and earthquake preparedness is a part of daily life. There are many fault lines (Calaveras and Verona Faults) and the Alquist-Priolo fault zone that run through and around Pleasanton.[7] Though there is some evidence that connects global climate change and earthquake risks, further research is needed to better understand this relationship. However, there is a clear nexus between the two when considering post-earthquake impacts and leveraging climate resilience actions for earthquake preparedness.



Though it is difficult to predict the damages from a significant earthquake, future climate change may exacerbate other risks following such an event. For example, earthquakes often trigger landslides. If an earthquake happens after an intense rain event or after multiple years of wildfires in a certain area, both of which contribute to slope instability and are more likely due to climate change, the resulting landslide may be worse and cause greater damage as a result.

There is also an opportunity to build climate resilience while preparing for natural disasters. Coordinated planning between climate action strategies and disaster preparedness can enhance local governments' ability to respond to natural disasters. Strategic investments into resilient infrastructure can provide multiple benefits through cost-savings, social cohesion, and infrastructure redundancy during and after an earthquake or other natural disasters.[8]

[7] City of Pleasanton. (2009). Chapter 5: Public Safety Element. In: Pleasanton General Plan 2005-2025: A Guide to Community Resources, Future Trends, and Long-Range Plans. Amended February 5, 2013.

[8] International Institute for Sustainability Development. (2017). Building a Climate-Resilient City: Disaster preparedness and emergency management. https://www.iisd.org/sites/default/files/publications/pcc-brief-disaster-mangement-emergency-preparedness.pdf.

Land Use – Low to Moderate Vulnerability

Climate Impacts	Moderate to High
Adaptive Capacity	Moderate
Climate Vulnerability	Moderate to High

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Extreme rain events can lead to changing runoff patterns. The intersection of land use and extreme rain may multiply flooding risks of certain planning sectors and geographical areas (e.g. impervious surfaces, stormwater infrastructure, natural habitats to filter and retain rainwater). Land use can create urban heat islands in highly urbanized areas. Ambient nighttime temperatures in urbanized areas can be 22°F warmer than exurban or rural geographical counterparts.[9] Wildland-urban interfaces have higher risk of wildfire spread due to a combination of housing-vegetation density and fire risk-mitigation measures taken by homeowners. [10,11]	In the 1% and 0.2% annual chance floodplain, certain land uses are more exposed to flooding (single family homes, commercial businesses). 30.3% and 32.4% of the high and very high landslide susceptibility area is zoned for residential use. Future land use in a moderate fire hazard severity zone (FHSZ) is primarily zoned for residential, religion/assembly, and educational uses. Future land use in high FHSZ is primarily zoned for residential and education uses. Future land use in very high FHSZ is primarily zoned for residential use.[12] Eastern and southern Pleasanton is classified as part of the wildland-urban interface, with most of the area being classified as an 'interface' area. [10,13]	Currently 56.7% of the 1% annual chance floodplain and 39.8 of the 0.2% annual chance floodplains are zoned for vacant/ROW/water/open space uses. Proactive land use planning can minimize risks for residents. As land becomes more urbanized, fire risk will decrease. With future growth and development in Pleasanton, fire risk can also be mitigated with stronger land use and building codes.[14]

[9] Ackerly et al. (2018). San Francisco Bay Area Summary.

[10] Wildland-Urban Interface is defined as an area of transition between unoccupied land (wildland) and human development that is often at higher risk of experiencing catastrophic wildfire due to a variety of ecological and development factors.

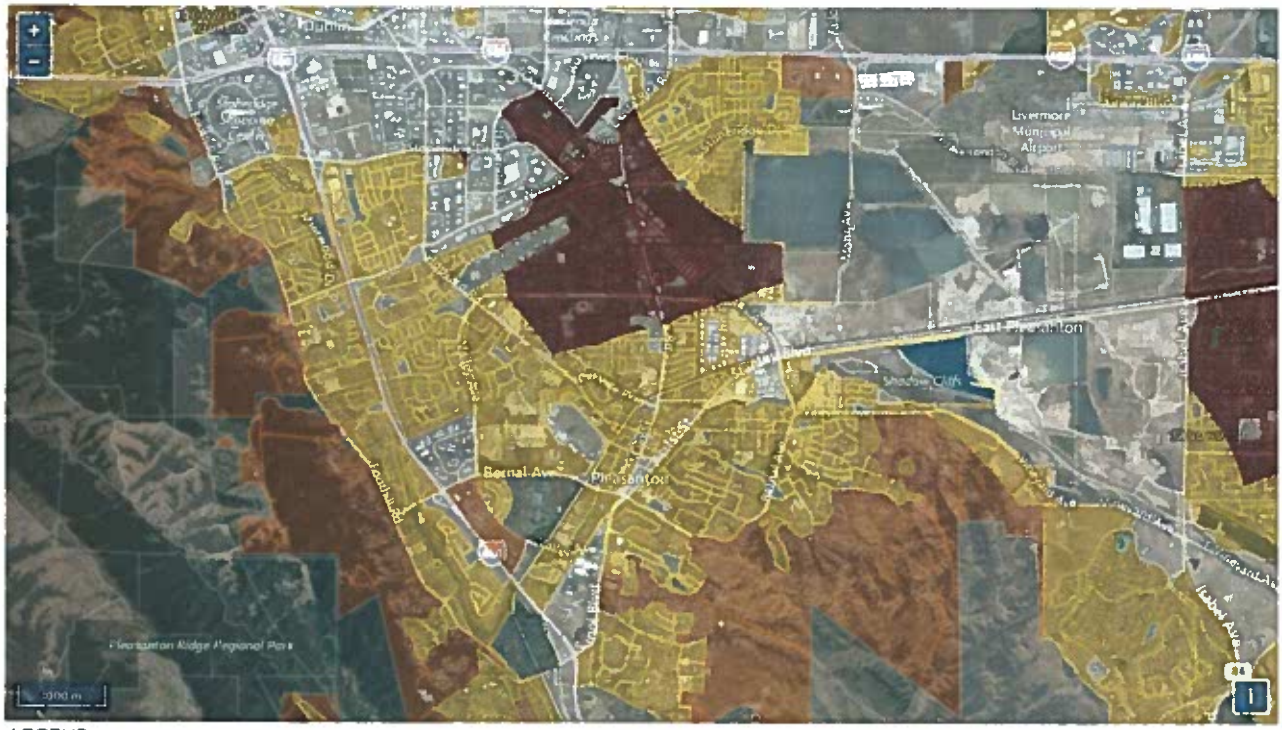
[11] Radeloff, V.C., D.P. Helmers, H.A. Kramer, M.H. Mockrin, P.M. Alexandre, A. Bar-Massada, V. Butsic, T.J. Hawbaker, S. Martinuzzi, A.D. Syphard, and S.I. Stewart. (2018). Rapid growth of the U.S. Wildland Urban Interface raises wildfire risk. *Proceedings of the National Academy of Sciences*. 115(13): 3314-3319.

[12] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[13] Silvis Lab. (2017) Silvis Lab. (2017). The 2010 Wildland-Urban Interface of the Conterminous United States. http://silvis.forest.wisc.edu/data/wui-change/.

[14] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

Figure 12. Wildland-Urban Interface Designated Areas in Pleasanton, CA. Areas marked in yellow are designed Interface areas and areas marked in orange are designated Intermix areas.



LEGEND

Wildland-Urban Interface (WUI)

- Interface
- Intermix

Non-WUI Vegetated

- No housing
- Very low housing density

Non-Vegetated or Agriculture

- Low & very low housing density
- Medium & high housing density
- Water

Opportunities to Enhance Climate Resilience

There are multiple ways to enhance the resilience of Pleasanton's transportation systems and land use. Below we outline several actions identified in various plans that can increase the capacity to adapt and cope with future climate change or mitigate risks.

Action	Sectors Addressed	Mitigate Climate Impacts	Enhance Adaptive Capacity	GHG Mitigation Potential
Enhance destination and fast-charging EV-charging stations along transportation routes[15]	Transportation Systems		✓	✓
Strategic land use planning (e.g. prioritize habitat connectivity and complexity to mitigate fire risk, improve water filtration, improve soil stability)[16]	Transportation Systems, Land Use	✓		✓
Create redundancy in public transportation options	Transportation Systems		✓	✓
Increase homeowners' awareness to mitigate fire risk	Land Use		✓	
Climate resilient transportation infrastructure (e.g. elevating roads to protect from floods, heat-resistant asphalt when re-paving)[17]	Transportation Systems	✓	✓	

[15] Ackerly et al. (2018). San Francisco Bay Area Summary.

[16] Sleeter, B.M., T. Loveland, G. Domke, N. Herold, J. Wickham, and N. Wood. (2018). Land Cover and Land-Use Change: In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*. Eds. Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycockm and B.C. Stewart. U.S. Global Change Research Program, Washington D.C., USA, pp. 202-231. Doi: 10.7930/NCA4.2018.CH5.

[17] Jacobs et al. (2018). Transportation: In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*.

Water Management

Warmer air temperatures, less regional snowpack, and changes in seasonal precipitation are very likely to cause more frequent and prolonged water shortages. Extreme storms and rainfall are likely to overwhelm wastewater and stormwater systems.

HIGH VULNERABILITY

Water Supply and Availability

Warmer temperatures, less snowpack, and changing seasonal precipitation patterns will significantly impact future **water supply availability and worsen summer water deficits**. Droughts will become more severe.

LOW VULNERABILITY

Wastewater Infrastructure

Heavy rainfall events and storm events are likely to increase the stress on **existing wastewater collection and treatment** processes and operations.

MODERATE VULNERABILITY

Stormwater Infrastructure

Heavy rainfall events and storm events is likely to **overwhelm existing stormwater infrastructure,** leading to more **frequent flooding events** with associated **human health consequences**.

Water Supply and Availability – High Vulnerability

Climate Impacts	High
Adaptive Capacity	Moderate
Climate Vulnerability	High

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Earlier melting of snowpack, seawater intrusion into groundwater, runoff/pollutant intrusion into groundwater, increased rates of evapotranspiration, and levee failures may contaminate Bay Area water supplies. This could lead to lack of potable water for the greater Bay Area and have implications for regional water security. Future impacts to snowpack and precipitation changes will increase the water deficit, especially in the summer, and lead to increased water releases from storage due to mismatch of water demand and supply. Less snowpack will also very likely stress existing reservoirs, impact surface water supply, imported water, and water transfer availability.[1] Drought frequency will likely increase and last longer.[2,3]	City of Pleasanton Utilities Division purchases 80% of water from Zone 7 Water Agency and 20% from local groundwater pumped from City-owned wells. Droughts will have significant economic impacts (agriculture, water-related businesses), environmental impacts, and social impacts (health, safety, sense of place).[4] Zone 7 supplies Pleasanton with water from State Water Project (which gets water from the Sacramento-San Joaquin Delta via California Aqueduct and conveys to Tri-Valley area via the South Bay Aqueduct); surface runoff from Del Valle Reservoir, and local groundwater.[5]	Zone 7 Water Agency has its Water Management Plan that has contingency plans for droughts. CA also has the California Drought Contingency Plan. City of Pleasanton also has prepared for water supply interruptions and water shortage contingency plans.[6] Self-sufficient water systems account for about 2/3 of water systems in the Bay Area. These systems have less resources to adapt if water levels are too low. These systems are often managed for short-term coping (e.g. less watering of gardens/outdoor water restrictions), rather than substantial transformational investments.[7]

[1] Ackerly, D., A. Jones, M. Stacey, and B. Riordan. (2018). San Francisco Bay Area Summary Report. California's Fourth Climate Change Assessment. University of California, Berkeley. Publication number: CCCA4-SUM-2018-005.

[2] Tetra Tech. (2018). Tri-Valley Local Hazard Mitigation Plan. Prepared for City of Dublin, City of Livermore, and City of Pleasanton. Project #103S4859.

[3] City of Pleasanton. (2012). Climate Action Plan.

[4] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

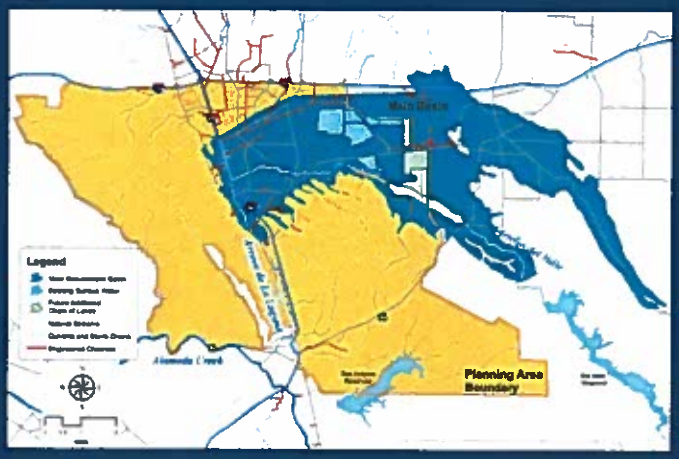
[5] City of Pleasanton. (2009). Chapter 8: Water Element. In: Pleasanton General Plan 2005-2025: A Guide to Community Resources, Future Trends, and Long-Range Plans.

[6] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[7] Ackerly et al. (2018). San Francisco Bay Area Summary.

Zone 7 Water Agency

Zone 7 supplies Pleasanton with water from State Water Project (which gets water from the Sacramento-San Joaquin Delta via California Aqueduct and conveys to Tri-Valley area via the South Bay Aqueduct), surface runoff from Del Valle Reservoir, and local groundwater.



Per- and Polyfluoroalkyl Substances and Water Quality

Per- and Polyfluoroalkyl Substances (PFAS) are human-made chemicals that are present in a range of products, such as fire-fighting substances, clothing, carpets, cleaning products, cookware, and food packaging. PFAs can accumulate in drinking water sources through a variety of pathways, including from fire training and response sites, laundry, dishwashing, industrial sites, landfills, and wastewater treatment plants. PFAs are correlated with adverse health outcomes such as increased cholesterol levels, tumors, low infant birth weights, effects on the immune system, cancer, and thyroid hormone disruption.[8] The U.S. Environmental Protection Agency has a lifetime health advisory of 70 parts per trillion (ppt) for PFAS. California has also begun to establish regulatory standards (i.e. maximum contaminant levels) for PFAS, and Zone 7 Water Agency voluntarily monitors its water supply sources.[9]

Although some research examines the interactions between climate change and contaminants, exposure to PFAS is not directly linked to increased vulnerability to climate change impacts. However, it is important to consider the suite of interacting risks between future climate risks and water contaminants. For example, people who are exposed to PFAS, and develop adverse health outcomes as a result, may face compounding health risks to future climate change impacts, such as poor air quality from wildfires or water-borne or related diseases from flooding events. Coordinated investments into climate adaptation strategies (e.g., more filtration of drinking water to prevent contaminants from entering the groundwater/surface water supply) can complement water quality monitoring efforts to reduces future PFAS exposure.

[8] https://www.epa.gov/pfas/basic-information-pfas
[9] https://www.zone7water.com/pfas-information

Wastewater Infrastructure – Low Vulnerability

Climate Impacts	Low to Moderate
Adaptive Capacity	Moderate to High
Climate Vulnerability	Low

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Wastewater treatment plants are sensitive to heavy rainfall and extreme weather events. Wastewater treatment plants near floodplains may face compounding impacts of inundation from heavy rainfall and sea level rise.[10]	Pleasanton provides its own sewage collection facilities within the City's limits, the Dublin-San Ramon Services District provides sewage treatment services, and the Livermore-Amador Valley Water Management Agency provides export/treated sewage disposal service for treated sewage effluent. There is over 250 miles of stormwater infrastructure. Water collection sizing was determined in 2006's Wastewater Collection System Master Plan, however, did not account for future population growth, development, or climate change. Wastewater treatment plan is now 17 million gallons per day (up from 11.5 million gallons per day).[11]	Pleasanton has already begun thinking about how to manage wastewater with a growing population, which may accommodate fluctuations in wastewater management due to climate change. Pleasanton has also secured capacity for future projections of increased wastewater flow.[12]

[10] Ackerly et al. (2018). San Francisco Bay Area Summary.
[11] City of Pleasanton (2009). Chapter 8: Water Element.
[12] City of Pleasanton (2009). Chapter 8: Water Element.

Stormwater Infrastructure – Moderate Vulnerability

Climate Impacts	Moderate to High
Adaptive Capacity	Moderate
Climate Vulnerability	Moderate

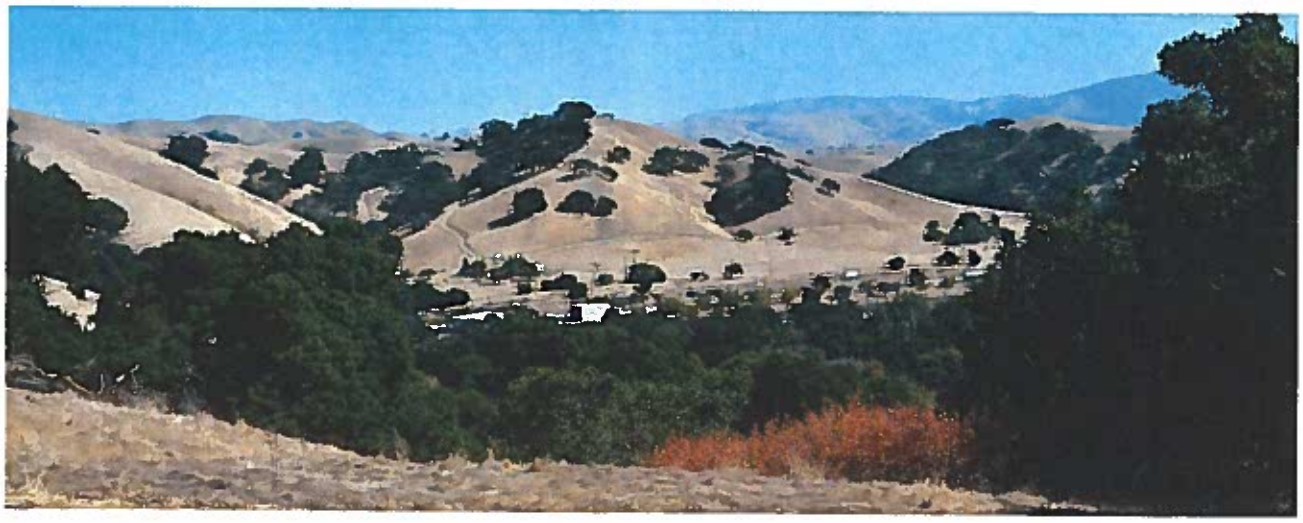
CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Extreme rain events may overwhelm stormwater infrastructure, as influent rainfall volumes can be up to seven times greater than normal. This overload could lead to sewer waters spilling over in urban areas, contaminating groundwater supplies and untreated water flooding homes, businesses, neighborhoods, and rivers/streams.[13,14]	Amador Valley already experiences frequent and substantial flooding because many streams which drain large areas of impermeable soils converge in the area. Main flooding risk from stormwater is caused by low capacity of the lower reaches of the Arroyo de la Laguna, causing backwater flooding.[15]	Over the past 20 years, there have been extensive flood channel improvements to mitigate flooding for Pleasanton. The City currently requires all new developments to size storm drains to accommodate extreme rainfall events. Cooperation with Zone 7 for stormwater management. The Chain of Lakes was developed for seasonal water storage and conveyance, floodwater and stormwater detention and storage.[16]

[13] Ackerly et al. (2018). San Francisco Bay Area Summary.
[14] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.
[15] City of Pleasanton (2009). Chapter 8: Water Element.
[16] City of Pleasanton (2009). Chapter 8: Water Element.

Opportunities to Enhance Climate Resilience

There are multiple ways to enhance the resilience of Pleasanton's water systems. Below we outline several actions identified in various plans that can increase the capacity to adapt and cope with future climate change or mitigate risks.

Action	Sectors Addressed	Mitigate Climate Impacts	Enhance Adaptive Capacity	GHG Mitigation Potential
Continue support and implementation for the Chain of Lakes	Water Supply and Availability, Stormwater Infrastructure	✓	✓	
Account for future flows and storms due to climate change in stormwater infrastructure sizing	Stormwater Infrastructure		✓	
Increase municipal water storage capacity to create redundancy in the water supply	Water Supply and Availability	✓	✓	✓
Enhance non-potable wastewater recycling capacity	Water Supply and Availability, Wastewater Infrastructure		✓	
Enhance green stormwater infrastructure	Stormwater Infrastructure, Wastewater Infrastructure	✓	✓	✓



Natural Systems and Biodiversity

Warmer temperatures, changes in precipitation and hydrology, and more frequent and prolonged droughts will change how certain habitats, animals, and plants, will respond to future climatic conditions.

MODERATE VULNERABILITY

Terrestrial Habitats

Warmer temperatures and changes in precipitation will have a variety of impacts on vegetation, such as affecting **habitat suitability for conifer trees.**

MODERATE TO HIGH VULNERABILITY

Aquatic Habitats

More frequent droughts, warmer streams, and less summer streamflow will affect **water quality, quantity,** increase prevalence of **disease and pests,** and **stress aquatic and riparian wildlife.**

MODERATE VULNERABILITY

Habitats and Biodiversity

Climate impacts will affect wildlife **habitat suitability** and alter seasonal **timing of lifecycle events. Endangered and threatened species** are particularly sensitive to climate change.

LOW TO MODERATE VULNERABILITY

Agriculture

Warmer temperatures and less water availability will affect **crop and livestock productivity and quality.**

Pleasanton's Wildlife

Pleasanton is home to a diversity of wildlife that helps maintain local biodiversity, native flora and fauna, and recreation.

Reptiles	Amphibians	Birds	Other fish and mammals
Alameda whipsnake [a,b]	California tiger salamander [a]	Burrowing owl	Bears
Silvery legless lizard	California red-legged frog [a]	Cooper's hawk	Coyotes
Western pond turtle	Foothill yellow-legged frog	Golden eagle	Deer
		Northern harrier	Mountain lions
		White-tailed kite [c]	Rainbow trout
			Channel catfish

[a] Federally listed as "threatened", or a species that may become endangered in all or part of its habitat range.
[b] State listed as "threatened".
[c] State listed as "fully protected animal".

Terrestrial Habitats – Moderate Vulnerability

Climate Impacts	Moderate
Adaptive Capacity	Moderate
Climate Vulnerability	Moderate

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Warmer temperatures and less precipitation will likely lead to less habitat suitability for evergreen conifer trees (e.g. Douglas firs, redwoods) and have suitable habitat contract coast-wards. Montane chaparral and coastal sage habitat will also contract. Some habitat and vegetation types, such as coastal live oak and chamise chaparral shrubland, will benefit with warmer and drier conditions. There is a lot of uncertainty for other types of vegetation (e.g. mixed evergreen forests, grasslands, etc...).[1] There is an increased probability for the spread of invasive plant species, plant and animal disease, and insect infestations after an area has burned, which may further destroy endangered species habitat and decrease soil quality.[2]	Pleasanton is predominantly grassland habitat and has some evergreen conifer trees.[3] Pleasanton also has some woodland habitat systems.[4] These habitat areas will respond to climate change differently. Exposure to wildfires in Pleasanton, for terrestrial ecosystems, is fairly low.[5] However, regional wildfires may have downstream or spillover ecosystem impacts for Pleasanton's terrestrial systems.	Grassland habitat suitability is as likely as not to be more dependent on land use decisions, grassland management (e.g. prescribed burnings, grassland connectivity, restoration) than future climate change. Land use decisions will heavily influence the adaptive capacity of natural terrestrial systems in the future.[6]

[1] Ackerly, D., A. Jones, M. Stacey, and B. Riordan. (2018). San Francisco Bay Area Summary Report. California's Fourth Climate Change Assessment. University of California, Berkeley. Publication number: CCCA4-SUM-2018-005.

[2] Tetra Tech. (2018). Tri-Valley Local Hazard Mitigation Plan. Prepared for City of Dublin, City of Livermore, and City of Pleasanton. Project #103S4859.

[3] Ackerly et al. (2018). San Francisco Bay Area Summary.

[4] City of Pleasanton. (2009). Chapter 7: Conservation and Open Space Element. In: Pleasanton General Plan 2005-2025: A Guide to Community Resources, Future Trends, and Long-Range Plans. Adopted 21 July 2009.

[5] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[6] Ackerly et al. (2018). San Francisco Bay Area Summary.

Aquatic Habitats – Moderate to High Vulnerability

Climate Impacts	Moderate to High
Adaptive Capacity	Moderate
Climate Vulnerability	Moderate to High

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Warmer temperatures, shifting precipitation patterns, and hydrological shifts will increase the prevalence of invasive species and generally decrease habitat suitability for aquatic and riparian species.[7,8] Fish, especially salmon populations, are very likely to be stressed even further from increase in stream temperatures and timing of peak streamflow. More frequent droughts are likely to negatively impact water quality and quantity for Bay Area streams. Upstream deforestation and tree mortality from insects, diseases, and wildfires may have severe implications for downstream water quality and sedimentation. Lower summer flows and increased temperatures can also create physiological stress on wildlife and fish, greater disease susceptibility, and higher rates of primary productivity (which can lead to eutrophication).[9]	Wetlands and riparian habitats are situated near Pleasanton's lakes and streams. Riparian habitats are home to many vegetation and wildlife species and are important for many types of ecosystem functions (food, shelter, flood control, water quality control). There are riparian habitats in Pleasanton near Arroyo del Valle, Arroyo Mocho, and Arroyo de la Laguna.[10]	Currently, new development permitting requires consideration of wildlife and riparian habitat, especially for any state or federally protected species, and mitigation of development impacts to natural habitat areas.[11]

[7] Ackerly et al. (2018). San Francisco Bay Area Summary.
[8] City of Pleasanton. (2012). Climate Action Plan.
[9] Ackerly et al. (2018). San Francisco Bay Area Summary.
[10] City of Pleasanton (2009). Chapter 7: Conservation and Open Space Element.
[11] City of Pleasanton (2009). Chapter 7: Conservation and Open Space Element.

Wildlife and Biodiversity – Moderate Vulnerability

Climate Impacts	Moderate
Adaptive Capacity	Low to Moderate
Climate Vulnerability	Moderate

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Riparian wildlife and habitat will likely contract under warmer conditions. Specifically, amphibians and reptiles will be particularly sensitive to changes in temperature. Pleasanton has multiple endangered or threatened species that include the Alameda whipsnake, California tiger salamander, and the bearded clover.[12,13] There are several threatened and endangered insect species (mostly beetles and butterflies) that serve important pollinator, nutrient processing, and food web functions. These insects are highly sensitive to climate change, and the processes and timing of events they may rely on for life cycle events (phenology) is also sensitive to warmer conditions.[14]	Food webs and suitable habitat will very likely be disrupted. Wildlife habitat may be degraded through loss of wetlands, lakes, and vegetations. There may be acute short-term impacts from warmer temperatures and droughts, but species and habitats may recover in the long-term.[15] Wildfires in upland areas can have some downstream ecosystem function impacts. Ecosystem connectivity is sensitive to changes, and even though wildfires are unlikely to happen within Pleasanton, there may be cascading impacts for Pleasanton.	Currently, new development permitting requires consideration of wildlife habitat, especially for any state or federally protected species, and mitigation of development impacts to natural habitats for wildlife.[16]

[12] Ackerly et al. (2018). San Francisco Bay Area Summary.
[13] City of Pleasanton. (2012). Climate Action Plan.
[14] Ackerly et al. (2018). San Francisco Bay Area Summary.
[15] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.
[16] City of Pleasanton (2009). Chapter 7: Conservation and Open Space Element.

Agriculture – Low to Moderate Vulnerability

Climate Impacts	Low to Moderate
Adaptive Capacity	Moderate to High
Climate Vulnerability	Low to Moderate

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Crop yields will likely decrease due to less water for irrigation, heat stress, and increased prevalence of pests and diseases.[17,18] Livestock productivity may decrease due to warmer temperatures (e.g. milk production).[19]	Pleasanton has some irrigated farmland. Ruby Hill area has many grape vineyards for wine. Many grazing areas are designated in the Planning Area for livestock. There are also some other small farm-based crops in the Pleasanton region (e.g. tomatoes, sugar beets, walnuts, etc...).[20] Local agricultural producers and farms provide products for local farmer markets in Pleasanton and the broader Bay Area region. Impacts to these agriculture and livestock products will have local and regional consequences.[21]	Agricultural is historically a very adaptive sector. Farmers have been adaptable to changes in climate through behavioral change and adaptive management strategies.[22]

[17] Ackerly et al. (2018). San Francisco Bay Area Summary.

[18] City of Pleasanton. (2012). Climate Action Plan.

[19] Gowda, P., J.L. Steiner, C. Olson, M. Boggess, T. Farrigan, and M.A. Grusak. (2018). Agriculture: In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*. Eds. Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycockm and B.C. Stewart. U.S. Global Change Research Program, Washington D.C., USA, pp. 391-437. Doi: 10.7930/NCA4.2018.CH10.

[20] City of Pleasanton (2009). Chapter 7: Conservation and Open Space Element.

[21] City of Pleasanton. (2012). Climate Action Plan.

[22] Gowda et al. (2018). Agriculture: In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*.

Opportunities to Enhance Climate Resilience

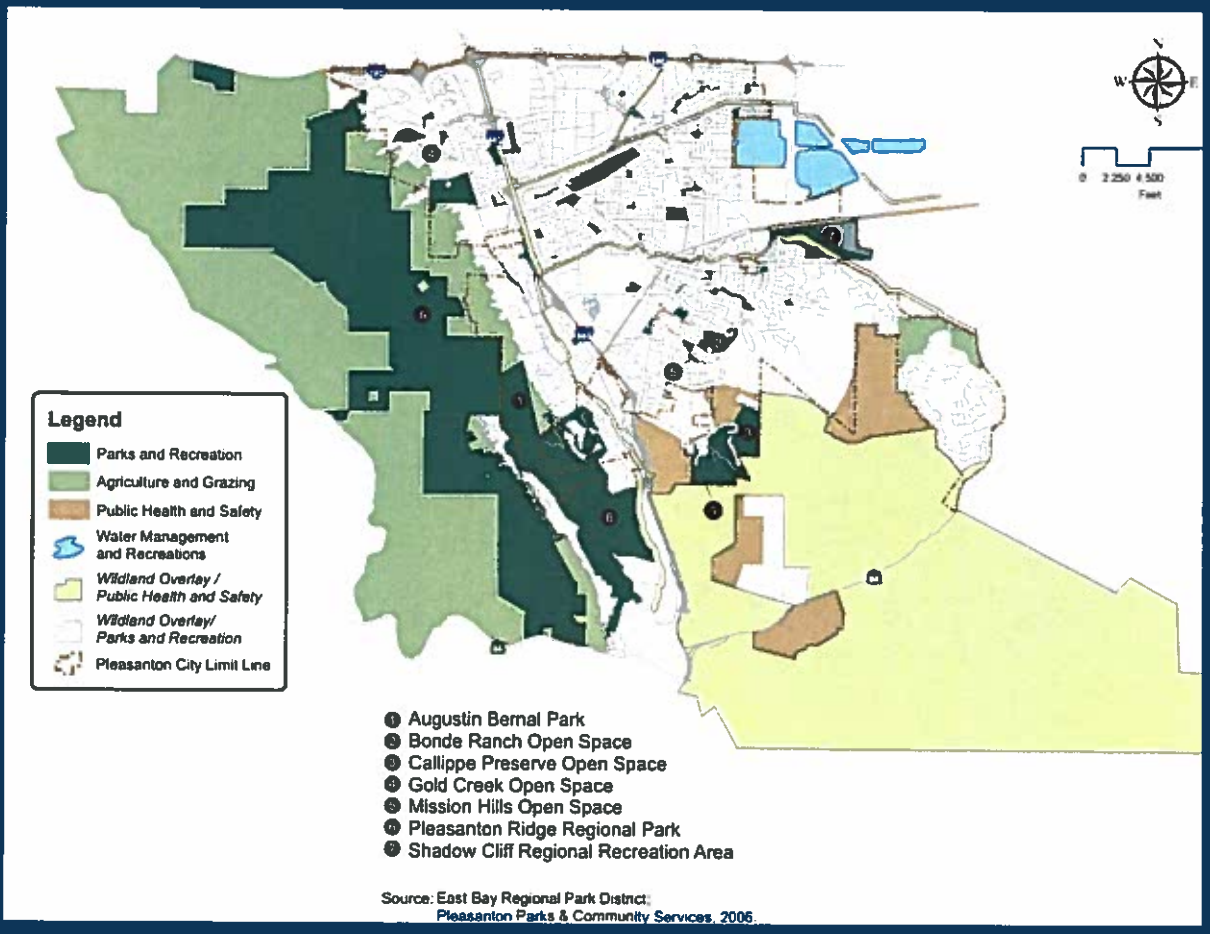
There are multiple ways to enhance the resilience of Pleasanton's natural ecosystems and biodiversity. Below we outline several actions identified in various plans that can increase the capacity to adapt and cope with future climate change or mitigate risks.

Action	Sectors Addressed	Mitigate Climate Impacts	Enhance Adaptive Capacity	GHG Mitigation Potential
Enhance local and regional habitat connectivity	Terrestrial Habitats	✓	✓	✓
Restore riparian habitat areas	Terrestrial Habitats, Aquatic Habitats, Wildlife and Biodiversity		✓	✓
Promote community-based science groups to conduct invasive species monitoring	Wildlife and Biodiversity	✓		✓
Promote heat-tolerant crops for local agricultural producers – creating supply at local farmers markets	Agriculture		✓	✓

Climate change and historic sites and recreational opportunities

Pleasanton has a vibrant cultural, historical, and recreational areas that makes it unique and a great place to live and work. Downtown Pleasanton has many historic buildings and neighborhoods in its Downtown area. Parks and open green spaces are scattered all over Pleasanton, providing opportunities for recreation, hiking, and sports. Water-based recreation and angling is also available in surrounding lakes, rivers, and reservoirs. There are also multiple Pleasanton wineries reliant on wine grapes grown in Pleasanton and its surrounding areas.

Future climate change is likely to affect all of these aspects of Pleasanton's culture. Historic buildings downtown face increased flooding risk from storms and the Arroyo del Valle. Regional wildfires may affect summer and fall recreational opportunities due to wildfire smoke and poor air quality. Warmer temperatures may increase demand for water-based recreation but impacts to water supply may affect opportunities and access. And heat stress may damage grape varietals important to the local wineries.



Public Health

Warmer temperatures, extreme storms and weather events will very likely lead to negative public health outcomes, increasing heat-related illnesses, respiratory illnesses, stress and anxiety, and stress the healthcare system.

LOW VULNERABILITY

Mental Health

Displacement and damage from storms and extreme weather and **loss of income** due to climate change is likely to lead to more **mental health illnesses.**

MODERATE TO HIGH VULNERABILITY

Heat-related Illnesses

Warmer summers will very likely increase **heat-related illnesses.** People with chronic health conditions and elderly people are particularly susceptible.

MODERATE VULNERABILITY

Respiratory Illnesses

Warmer air temperatures and wildfire smoke from regional fires will very likely increase **respiratory illnesses.** People with chronic health conditions, youth, and the elderly are particularly susceptible.

MODERATE VULNERABILITY

Acute Injuries and Displacement

Extreme weather and storms are likely to increase **acute injuries and displacement.** Although very unlikely, rare and catastrophic events may cause loss of life.

LOW TO MODERATE VULNERABILITY

Health Access and Emergency Services

The **social safety net of healthcare services** will likely be stressed due to climate change. Extreme weather events may disrupt **access to emergency services.**

Vulnerable Community Groups

Climate change is considered a **risk multiplier** for health outcomes, magnifying and exacerbating existing health disparities and risks. Some groups have been routinely identified as experiencing a disproportionate burden of the health impacts of climate change. These community groups include elderly people, young children, people with chronic physical and mental health conditions, low-income people, communities of color, non-English speakers, socially isolated individuals, and communities with low social cohesion.[1]

Mental Health – Low Vulnerability

Climate Impacts	Low
Adaptive Capacity	Moderate to High
Climate Vulnerability	Low

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Any loss of income due to climate impacts is likely to lead to increased stress, anxiety, and loss of employer-covered healthcare.[2] Furthermore, flooding may cause displacement from homes due to damage, mold, and mildew. This displacement may cause or worsen mental health illnesses and fatigue.[3,4]	People who work in industries reliant on natural resources, such as agriculture and wine industries, may be financially impacted by climate change.[2,5] As of 2017, there have been 8 flood insurance claims with the National Flood Insurance Program, with damages worth approximately $155,000.[6]	97.1% of Pleasanton residents have health care coverage. 70.5% have employer coverage, 4.65% have Medicaid, 10.3% have Medicare, 11.2% have non-group insurance, and 0.4% have military or VA health insurance.[7]

[1] Maizlish, N., D. English, J. Chan, K. Dervin, and P. English. (2017). Climate Change and Health Profile Report: Alameda County. Office of Health Equity, California Department of Public Health. Sacramento, CA.

[2] Tetra Tech. (2018). Tri-Valley Local Hazard Mitigation Plan. Prepared for City of Dublin, City of Livermore, and City of Pleasanton. Project #103S4859.

[3] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[4] City of Pleasanton. (2012). Climate Action Plan.

[5] Gonzalez, P., G.M. Garfin, D.D. Breshears, K.M. Brooks, H.E. Brown, E.H. Elias, A. Gunasekara, N. Huntly, J.K. Maldonado, N.J. Mantua, H.G. Margolis, S. McAfee, B.R. Middleton, and B.H. Udall. (2018). Southwest: In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*. Eds. Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycockm and B.C. Stewart. U.S. Global Change Research Program, Washington D.C., USA, pp. 1101-1184. Doi: 10.7930/NCA4.2018.CH25.

[6] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[7] U.S. Census Bureau. (2018). American Community Survey 5-year Estimate. Data visualized at https://datausa.io/profile/geo/pleasanton-ca/#health.

Heat-related Illnesses – Moderate to High Vulnerability

Climate Impacts	Moderate to High
Adaptive Capacity	Moderate
Climate Vulnerability	Moderate to High

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Extreme heat illnesses, such as heat stroke, heat stress, or other heat-induced illnesses will likely occur with warmer temperatures, especially in the summer.[8,9,10]	Heat-related emergency room visits in Alameda County between 2005-2010 was 109 emergency room visits per 100,000 people per year. People with obesity or a disability have higher rates of heat-related emergency room visits.[11] Night-time temperatures in developed urban areas can be up to 22°F warmer than exurban or rural counterparts.[12]	Homes and buildings in the inland Bay Area have air conditioning capabilities that can provide safety and cooling from extreme heat. People with physical and mobility constraints, cognitive impairments, economic constraints, or socially isolated individuals have lower abilities to cope with extreme heat.[13] Across the Southwest U.S., there is likely to be an additional 2,000 premature heat-related deaths under RCP8.5 by 2090.[14]

[8] Maizlish (2017). Climate Change and Health Profile Report: Alameda County.

[9] City of Pleasanton. (2012). Climate Action Plan.

[10] Ackerly, D., A. Jones, M. Stacey, and B. Riordan. (2018). San Francisco Bay Area Summary Report. California's Fourth Climate Change Assessment. University of California, Berkeley. Publication number: CCCA4-SUM-2018-005.

[11] Maizlish (2017). Climate Change and Health Profile Report: Alameda County.

[12] Ackerly et al. (2018). San Francisco Bay Area Summary.

[13] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[14] Environmental Protection Agency. (2017). Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment. U.S. EPA, Washington, D.C.

Respiratory Illnesses – Moderate Vulnerability

Climate Impacts	High
Adaptive Capacity	Moderate
Climate Vulnerability	Moderate to High

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Higher ambient temperatures facilitate ozone hotspots near the ground. Furthermore, heat waves and high pressures systems may lead to persistent trapping of airborne particulates that deteriorate air quality.[15] Wildfire smoke is likely to worsen breathing issues and decrease visibility, subsequently increasing and exacerbating acute and chronic respiratory illnesses.[16]	11.7% of Alameda County adult residents smoke cigarettes (21.8% among African American adults). 24.9% of Alameda County adults have hypertension, with prevalence being highest in American Indians and African Americans. 6.4% of Alameda County adults have diabetes, with prevalence being highest in American Indians. 18.6% of youth and 14% of adults have asthma, and both rates are higher than statewide averages. For youth, Hispanics and African Americans have the highest rates of asthma, whereas Whites have the highest asthma prevalence in adults. Pleasanton's chronic disease hospitalizations mirror county averages or are slightly below county averages.[17]	Specific groups, such as children, elderly, outdoor laborers, and those with chronic respiratory or cardiovascular illnesses will have lower ability to cope with decreased air quality. Additionally, first responders and firefighters face higher exposure to smoke inhalation and injuries related to poor air quality.[18,19]

[15] Ackerly et al. (2018). San Francisco Bay Area Summary.

[16] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

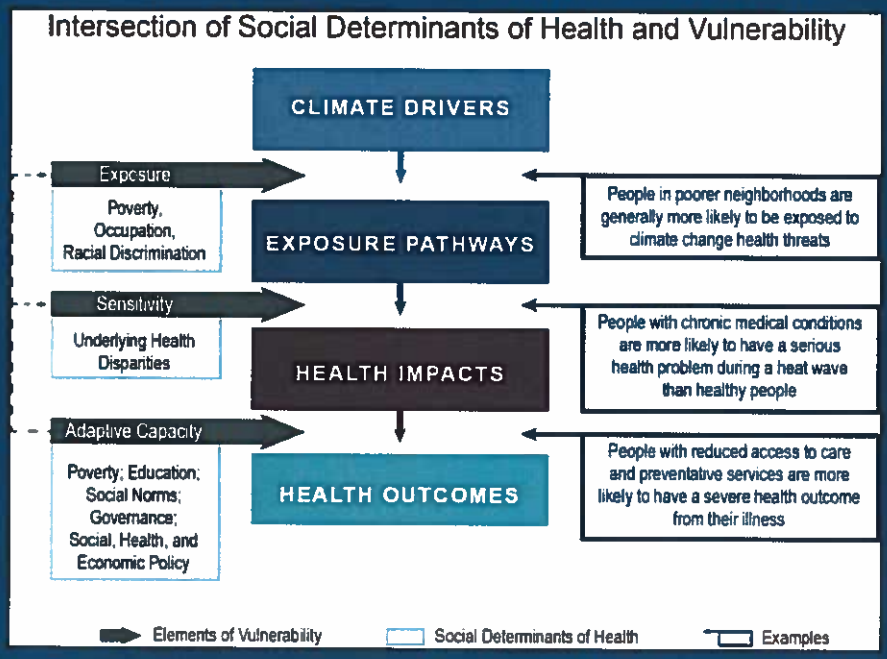
[17] Alameda County Public Health Department. (2014). Alameda County Health Data Profile, 2014: Community Health Status Assessment for Public Health Accreditation. The Alameda County Public Health Department Community Assessment, Planning and Education (CAPE) and Division of Communicable Disease Control and Prevention.

[18] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[19] Ackerly et al. (2018). San Francisco Bay Area Summary.

Social Determinants of Health and Climate Vulnerability

Social determinants of health affect all three elements of vulnerability – sensitivity, exposure, and adaptive capacity.[20] CalEnviroScreen has mapped out the pollution burden of all California communities, and Pleasanton communities face a relatively low to moderate pollution burden compared to other California communities. The most common pollution and environmental exposures for Pleasanton are diesel particulate matter, traffic density, hazardous waste sites, groundwater contaminants, and pesticides. The sensitivity and adaptive capacity of Pleasanton's neighborhoods are also not the same – some neighborhoods face higher rates of chronic illnesses, low birth rates, housing burden, unemployment, and linguistic isolation.[21]



[20] Gamble, J.L., J. Balbus, M. Berger, K. Boute, V. Campbell, K. Chief, K. Conlon, A. Crimmins, B. Flanagan, C. Gonzalez-Maddux, E. Hallisey, S. Hutchins, L. Jantarasami, S. Khoury, M. Kiefer, J. Kolling, K. Lynn, A. Manangan, M. McDonald, R. Morella-Frosch, M.H. Redsteer, P. Sheffield, K. Thigpen Tart, J. Watson, K.P. Whyte, and A.F. Wolkin. (2016). Ch. 9: Populations of Concern; In *The Impacts of Cliamte Change on Human Health in the United States: A Scientific Assessment*. U.S. Global Change Research Program, Washington, D.C., 2470286. http://dx.doi.org/10.7930/J0Q81B0T.

[21] CalEnviroScreen 3.0. (2018). https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30.

Acute Injuries and Displacement – Moderate Vulnerability

Dam failures are considered low likelihood but catastrophic events.

Climate Impacts	Low to Moderate
Adaptive Capacity	Moderate to High
Climate Vulnerability	Low

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
There is low risk of direct wildfire injuries. However, indirect wildfire smoke effects may lead to acute respiratory injuries. Landslide risk is high in hilly regions of the Bay Area. Increased heavy rain events will increase the likelihood of landslides and injuries.[22] There will be a likely increase in injuries and death from catastrophic weather events and flooding. Wildfires can directly injure or cause loss of life for Pleasanton's residents. However, there is a low likelihood of this occurring.[23]	8,790 people, or 11.6% of Pleasanton's population, live in high landslide susceptibility zone. 310 people, or 0.4% of Pleasanton's population, live in the very high landslide susceptibility zone. There are few people displaced if a 10% or 1% annual chance flood happens (109 and 386 respectively). However, there will be significant displacement if a 0.2% annual chance flood happens (11,531 people with 10,770 requiring short-term shelter). 7.8% (5,942) people exposed in the moderate fire hazard severity zone (FHSZ). 15.2% (11,528) people exposed in the high FHSZ. 3.3% (2,492) people exposed in very high FHSZ. There has been no direct loss of life from wildfires in Pleasanton.[24] Sonoma, Napa, and Santa Rosa fire of 2017 killed 44 people and hospitalized 185 people.[25] 5% of Alameda County live in high-risk wildfire areas.[26]	Specific groups, such as children, elderly, outdoor laborers, and those with chronic illnesses, will have lower ability to cope with wildfire smoke. Low-income people risk further isolation from social services and have lower rate of car ownership and rely on public transportation. Disruption to these services during extreme events can prolong risk to acute injuries and access to health care services. Vulnerable communities (e.g. low-income people, people reliant on natural resources, undocumented individuals, renters) have lower ability to adapt if wildfires happen.[27]

[22] Ackerly et al. (2018). San Francisco Bay Area Summary.

[23] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[24] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[25] Ackerly et al. (2018). San Francisco Bay Area Summary.

[26] City of Pleasanton. (2009). Chapter 5: Public Safety Element. In: Pleasanton General Plan 2005-2025: A Guide to Community Resources, Future Trends, and Long-Range Plans. Amended 5 February 2013.

[27] Ackerly et al. (2018). San Francisco Bay Area Summary.

Health Access and Emergency Services – Low to Moderate Vulnerability

Climate Impacts	Low to Moderate
Adaptive Capacity	Moderate to High
Climate Vulnerability	Low

CLIMATE IMPACTS		ADAPTIVE CAPACITY
Sensitivity	*Exposure*	
Future wildfires may disrupt access to health facilities and transportation routes for emergency services. Secondary impacts of wildfire smoke will likely increase the demand for medical services related to smoke and respiratory illnesses. Future extreme heat will likely increase the stress for medical services. Access to medical and emergency services will likely be disrupted in the case of flooding, landslides, wildfires, and/or disruption of communication lines.[28]	There is one medical/health facility in the very high fire hazard severity zone (FHSZ), one medical/health facility and one emergency services facility in the high FHSZ.[29] Parts of southern Pleasanton have emergency response times of over 5 minutes.[30] Emergency preparedness and response conditions are heavily influenced by socioeconomic factors.	Almost all of Pleasanton has an emergency response time of less than 5 minutes. However, there are some parts of southern Pleasanton that have emergency response times of over 5 minutes.[31]

[28] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[29] Tetra Tech (2018). Tri-Valley Local Hazard Mitigation Plan.

[30] City of Pleasanton. (2009). Chapter 5: Public Safety Element. In: Pleasanton General Plan 2005-2025: A Guide to Community Resources, Future Trends, and Long-Range Plans. Amended 5 February 2013.

[31] City of Pleasanton (2009). Chapter 5: Public Safety Element.

Opportunities to Enhance Climate Resilience

There are multiple ways to enhance the resilience of Pleasanton's public health systems and social safety net. Below we outline several actions identified in various plans that can increase the capacity to adapt and cope with future climate change or mitigate risks.

Action	Sectors Addressed	Mitigate Climate Impacts	Enhance Adaptive Capacity	GHG Mitigation Potential
Promote cooling centers to combat warmer summers[32]	Heat-related Illnesses, Respiratory Illnesses		✓	
Utilize land use planning to mitigate risks (e.g. urban heat islands, floodplains)	Heat-related Illnesses, Acute Injuries and Displacement	✓	✓	✓
Encourage and invest in community resilience hubs[33]	Mental Health, Acute Injuries and Displacement, Health Access and Emergency Services		✓	
Promote and enhance access to green spaces	Mental Health	✓	✓	✓
Develop extreme heat protocols for outdoor laborers (e.g. construction workers)	Heat-related Illnesses, Respiratory Illnesses		✓	

[32] Alameda County already doing this in Ashland and Hayworth.

[33] https://www.usdn.org/resilience-hubs.html.

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June 19, 2020
Rincon Project #: 19-08470

Megan Campbell, Associate Planner
City of Pleasanton
200 Old Bernal Avenue
Pleasanton, California 94566
Via email: mcampbell@cityofpleasantonca.gov

Subject: Final Memorandum Detailing GHG Emissions Inventory, Forecast, and Provisional Targets for Pleasanton Climate Action Plan Update

Dear Ms. Campbell:

This memorandum details the results of the greenhouse gas (GHG) emissions inventories completed for Pleasanton, the forecast of future GHG emissions, and the provisional GHG emissions reduction targets identified for the Pleasanton Climate Action Plan (CAP) Update for the years 2030 (Senate Bill [SB] 32 target year), 2045 (Executive Order [EO] B-55-018 target year), and 2050 (EO S-3-05 target year). This memorandum also quantifies the reduction impact that State regulations will have on Pleasanton's *business-as-usual forecast*[1] and presents the results in an *adjusted forecast.*[2] Target setting is an iterative process that must be informed by reductions that can realistically be achieved through development of feasible GHG reduction measures. As such, the targets identified herein (particularly the 2030, 2045, and 2050 targets) remain provisional until quantification and analysis of potential GHG reduction measures has been completed.

The City of Pleasanton has completed GHG emissions inventories[3] for 2010, 2015, and 2017 and updated the 2005[4] GHG inventory to measure progress toward the 2020 GHG reduction goals established in the first Pleasanton Climate Action Plan (CAP).[5] These inventories use the most recent population, employment, and emission factor data allowing for consistent and comparable methodologies across all inventory years and between Bay Area jurisdictions that are also using the East Bay Energy Watch (EBEW) GHG calculation methodology. These various inventories will assist in the preparation of the Pleasanton CAP Update by tracking progress in specific GHG emission sectors and to forecast future GHG emissions and develop a respective gap analysis that will assist in identifying CAP Update policies that will achieve longer-term GHG emissions targets.

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[1] Forecasts emissions based on population and job growth, with no reduction measures from federal, State, or local governments.

[2] The adjusted forecast scenario incorporates expected federal, State, and local GHG reduction measures into the emissions forecast to develop a more accurate forecast of emissions through 2045 and 2050.

[3] Note that all reference to inventories, forecasts, and targets in this memorandum are in reference to communitywide GHG emissions.

[4] The Updated 2005 GHG Emissions Inventory is an update of the previously prepared 2005 inventory that informed the first City CAP. This was done to use the most recent methodology, emission factors, and data sources available, as well as for consistency between other inventory years. The original updated 2005 inventory was created by East Bay Energy Watch, and then updated by Rincon (for more information on these updates, refer to Section 2.3 of the Technical Appendix).

[5] City of Pleasanton. 2012. City of Pleasanton Climate Action Plan. Available: <http://www.cityofpleasantonca.gov/gov/depts/os/env/cap/resources.asp>. Accessed April 14, 2020.

Future Pleasanton GHG emissions were forecasted for six different years (2020, 2025, 2030, 2040, 2045, and 2050) in terms of both a business-as-usual scenario[6] and an adjusted forecast scenario[7] in order to quantify expected emissions through 2050. In addition, five GHG emissions reduction target pathways are presented to establish 2025, 2030, 2035, 2040, 2045, and 2050 GHG emission reduction goals that may be adopted as part of the CAP Update.

This memorandum also summarizes the State GHG emissions targets, Pleasanton 2012 CAP emissions targets, provisional Pleasanton targets, and Pleasanton target pathway options to meet those targets. The provisional targets analyzed for the Pleasanton CAP Update include:

- Reduce GHG emissions a minimum of 15 percent below 2005 levels by 2020, which is consistent with Assembly Bill (AB) 32;[8]
- Reduce GHG emissions 40 percent below 1990 levels by 2030, which is consistent with SB 32[9] and in line with the reduction trajectory to achieve the State 2050 reduction goal (80 percent below 1990 levels) identified in Executive Order S-3-05;[10] and
- Reduce GHG emissions 80 percent below 1990 levels by 2050, consistent with Executive Order S-3-05 or achieve carbon neutrality by 2045, which is consistent with EO B-55-18.[11]

This memorandum is intended to summarize and inform City staff of the findings of the technical appendix attached to this memorandum that includes the full supporting methodology, calculations, and results.

[6] Forecasts emissions based on population and job growth, with no reduction measures from federal, State, or local governments.

[7] The adjusted forecast scenario incorporates expected federal, State, and local GHG reduction measures into the emissions forecast to develop a more accurate forecast of emissions through 2045.

[8] AB 32 codified the State's 2020 GHG emissions target by directing the California Air Resources Board (CARB) to reduce California's Statewide emissions to 1990 levels by 2020 (approximately equivalent to a 15 percent reduction from 2005 to 2008 levels). The AB 32 Scoping Plan encourages local governments to adopt a target that parallels the State's target. Refer to discussion of AB 32 on page 4.

[9] SB 32 codified the State's 2030 GHG emissions target by directing CARB to reduce California's Statewide emissions to 40 percent below 1990 levels by 2030. CARB is currently working on a Scoping Plan to demonstrate how the State will achieve of the 2030 target.

[10] Executive Order S-3-05 established ambitious GHG reduction targets for the State: reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. SB 32 establishes a Statewide mid-term GHG reduction target of 40 percent below 1990 levels by 2030. To remain consistent with the trajectory of SB 32 and S-03-05, emissions would need to be reduced 40 percent below 1990 levels over the 20-year period between 2030 and 2050, which is equal to approximately 2 percent per year. Since 2035 is 5 years past 2030, emissions would need to be reduced by an additional 10 percent over the 2030 target, which is 50 percent below 1990 in 2035 (equivalent to 58 percent below 2008 levels).

[11] The Pleasanton Climate Action Plan Update will not include measures designed for implementation out to years 2045 or 2050 but rather present 2045 or 2050 forecast emissions and identify preliminary 2045 or 2050 targets to demonstrate the City commitment to achieve the City's fair share of GHG emissions of State long-term 2045 or 2050 goal presented in Executive Orders B-55-18 or S-3-05, respectively.

State GHG Emissions Targets

The State of California considers GHG emissions and the impacts of global warming to be a serious threat to the public health, environment, economic well-being, and natural resources of California and has taken an aggressive stance to mitigate the State's contribution to climate change through the adoption of legislation and policies. The most relevant of these policies include:

- **Executive Order S-3-05 (2005).** Establishes Statewide GHG emissions reduction goals of reducing GHG emissions to 1990 levels by 2020 and reducing GHG emissions to 80 percent below 1990 levels by 2050. The 2050 goal was accelerated by the 2045 carbon neutral goal established by EO B-55-18, as discussed below.[12]
- **Assembly Bill 32 (2006).** Also known as the Global Warming Solutions Act, requires State GHG emissions be reduced to 1990 levels by the year 2020 (approximately a 15 percent reduction from 2005 to 2008 levels).[13]
- **Executive Order B-30-15 (2015).** Establishes Statewide GHG emissions reduction goals of reducing GHG emissions to 40 percent below 1990 levels by 2030.
- **Senate Bill 32 (2016).** Codified the Statewide GHG reduction goal of 40 percent below 1990 levels by 2030. CARB also adopted an updated Climate Change Scoping Plan in December 2017 that lays out a roadmap to achieve 2030 goals.
- **Executive Order B-55-18 (2018).** Expanded upon EO S-3-05 by creating a Statewide GHG goal of carbon neutrality by 2045. This goal is in addition to the existing Statewide GHG reduction targets established by SB 32.

Pleasanton 2012 CAP GHG Emissions Targets

The first Pleasanton Climate Action Plan, adopted in 2012, established a communitywide GHG emissions reduction target of 15 percent below its 2005 baseline by 2020. This target was consistent with the Statewide goal established by AB 32 in 2006 of reducing emissions to 1990 levels by 2020. This 15 percent reduction target was in line with current best practices at the time for the climate action plans developed for the County of Alameda and several Bay Area cities that also utilized 2005 baselines.

2017 GHG Emissions Inventory

The 2017 Pleasanton GHG emissions inventory serves as the inventory to inform development of future GHG emissions forecasts that will assist the City in setting GHG emissions targets that are consistent with State-level goals and the Pleasanton General Plan 2005-2025. In 2017, Pleasanton GHG emissions

[12] Executive Orders are binding only unto State agencies. Accordingly, EO S-03-05 will guide State agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local government or private actions.

[13] AB 32 also directed CARB to develop the AB 32 Climate Change Scoping Plan, which identifies mandatory and voluntary measures to achieve the Statewide 2020 emissions limit and encourages local governments to reduce municipal and community GHG emissions proportionate with State goals. It states that CARB, "encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community emissions that parallel the State commitment to reduce GHG emissions by approximately 15 percent from current levels by 2020" (p. 27). "Current" as it pertains to the AB 32 Climate Change Scoping Plan is commonly understood as between 2005 and 2008.

were estimated to be 588,553 metric tons (MT) of carbon dioxide equivalent (CO_2e).[14] Data was originally gathered by EBEW and then reviewed and updated by Rincon for consistency with the latest methodology available in the Community Protocol[15] and California Supplement[16]. The updated 2005 GHG Inventory corrected a few typological errors in the water and wastewater inventory sectors and removed the Bay Area Rapid Transit (BART) emissions, because the City of Pleasanton does not have direct control over BART and is unable to reduce these emissions and because BART data was not available for the subsequent inventories. A summary of these 2017 baseline inventory emissions by sector is provided in Table 1 and shown in Figure 1.

Table 1 2017 Pleasanton GHG Emissions Inventory Summary

Sector	Activity Data	Emission Factors	Units	MT CO_2e
Residential Electricity (kWh)	182,355,696	0.00009635	MT CO_2e/kWh	17,571
Nonresidential Electricity (kWh)	320,791,579	0.00009635	MT CO_2e/kWh	30,910
Direct Access Electricity (kWh)[4]	52,782,630	0.0002027	MT CO_2e/kWh	10,700
Residential Gas (therms)	11,796,750	0.00531	MT CO_2e/therms	62,647
Nonresidential Gas (therms)	10,579,242	0.00531	MT/CO_2e/therms	56,181
Passenger On-Road Transportation (VMT)	601,291,074	0.000338	MT CO_2e/mile	202,947
Commercial On-Road Transportation (VMT)	92,034,058	0.001366	MT CO_2e/mile	126,668
Off-Road Transportation (VMT)	N/A[1]	0.0806[2]	Effective Change in Service Population	48,634
Waste (tons)[5]	102,683	0.2860	MT CO_2e/Ton	29,357
Wastewater (kWh)	N/A[3]	N/A[3]	MT CO_2e/kWh	1,180
Water (kWh)	18,146,306	0.00009635	MT CO_2e/kWh	1,750
Total Emissions				**588,553**

MWh: megawatt hours; kWh: kilowatt hours; CO_2e: carbon dioxide equivalent; MT: metric tons; VMT: vehicle miles traveled;

[1] Off-road emissions calculated as a proportion of total emissions in Alameda County based on changes in population without activity data.

[2] Effective change in service population was defined as on the sum of new population and jobs in Pleasanton divided by the total sum of new jobs and population in Alameda County for each inventory year.

[3] Wastewater is a combination of stationery and process emissions.

[4] Direct access service is retail electric service where customers purchase electricity from a competitive provider called an Electric Service Provider instead of from a regulated electric utility. An Electric Service Provider is a non-utility entity that offers electric service to customers within the service territory of an electric utility.

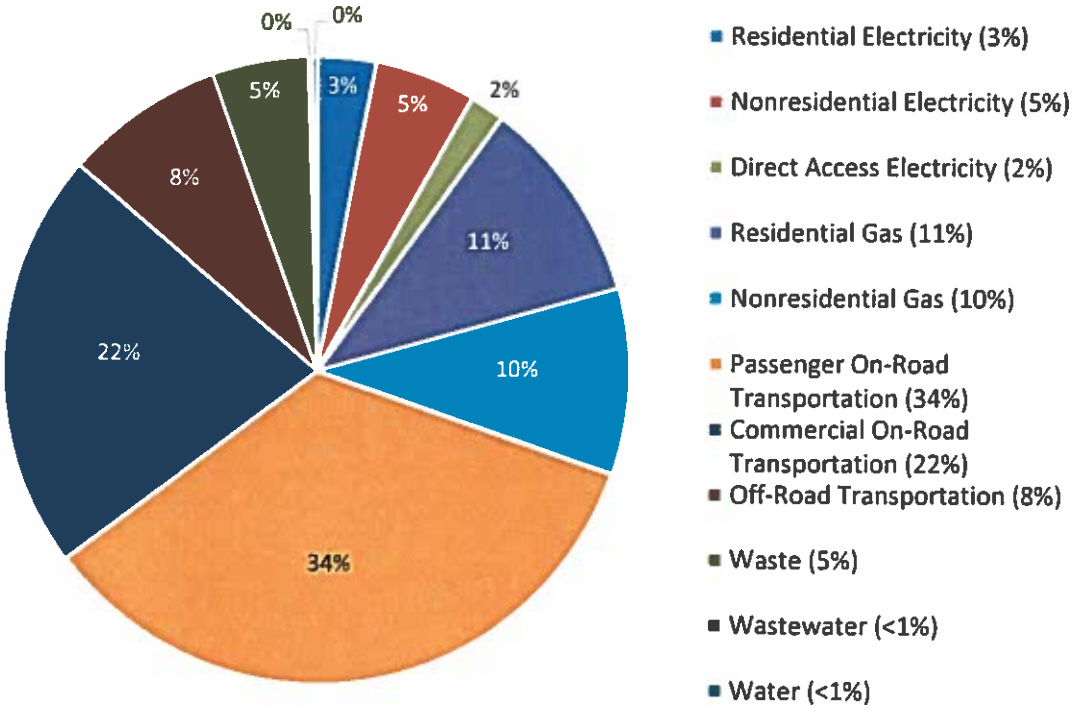
[5] Includes a small quantity (367 tons) of Alternative Daily Cover Waste for which a different emission factor was used (246 $MTCO_2e$/ton). This emissions factor was calculated using data from the CARB California Landfill Emissions Tool Version 1.3.

[14] Carbon dioxide equivalent is a term for describing GHG emissions in a common unit, signifying for any GHG the amount of CO_2 that would have the equivalent global warming impact. The equivalent amount of CO_2 is calculated based on the GHG global warming potential value.

[15] ICLEI. 2012. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Available: <https://icleiusa.org/publications/us-community-protocol/>. Accessed: April 14, 2020.

[16] Association of Environmental Professionals. 2013. The California Supplement to the United States Communitywide GHG Protocol. Available: <https://califaep.org/docs/California_Supplement_to_the_National_Protocol.pdf>. Accessed: April 14, 2020.

Figure 1 2017 Pleasanton Community GHG Emissions by Sector



Between 2005 and 2017, Pleasanton experienced a population increase of 15 percent but a per capita emissions reduction of 37 percent. This translates to a 28 percent reduction in total Pleasanton GHG emissions from 2005 to 2017, which exceeds the GHG emission target established in the 2012 CAP. Table 2 summarizes GHG emission changes in Pleasanton from 2005 to 2017, and Table 3 summarizes changes in activity data.[17]

Between 2005 and 2017, Pleasanton reduced GHG emissions in every sector except for nonresidential gas, which may have increased due to growth in development of the commercial and industrial sectors within the City. Major GHG emissions reductions were achieved in the waste and wastewater sectors, although these sectors make up smaller proportions of overall Pleasanton emissions as shown in Figure 1. It is worth noting that large GHG emissions reductions from electricity usage were driven largely by PG&E's electricity fuel mix, which saw a significant decrease in carbon intensity[18] from 2005 to 2017. Although there was an increase in passenger vehicle miles traveled (VMT), GHG emissions associated with the passenger on-road transportation sector declined because of the increased fuel efficiency of vehicles as detailed in Table 2 and Table 3.

[17] Table 1, Table 2, Table 3, and Figure 1 may present data in different ways, but they are summarizing the same data. On-road transportation includes both passenger and commercial on-road transportation.

[18] Carbon intensity is the amount of carbon by weight emitted per unit of energy consumed. For example, as the percentage of renewable energy sources used to produce electricity increases, the carbon intensity of that electricity decreases.

Table 2 Summary of Pleasanton GHG Emissions Changes from 2005 to 2017

	2005 ($MT CO_2e$)	2017 ($MT CO_2e$)	Percent Change
Residential Electricity	46,782	17,571	-62%
Nonresidential Electricity	89,385	30,910	-65%
Direct Access Electricity	21,479[1]	10,700	N/A
Residential Gas	66,175	62,647	-5%
Nonresidential Gas	43,094	56,181	+30%
Waste	35,497	29,358	-17%
Water	5,130	1,750	-66%
Wastewater	1,559	1,180	-24%
On-Road Transportation	386,963	329,615	-15%
Off-Road Transportation	117,067	48,634	-58%
Total Emissions	**813,131**	**588,553**	**-28%**
Emissions Per Capita	**12.2**	**7.7**	**-37%**

$MT CO_2e$: metric tons of CO_2 equivalent

[1] PG&E did not report data for direct access electricity usage in Pleasanton for 2005 and 2010 due to the CPUC's 15-15 privacy rule. Direct access electricity usage was estimated for these years using the average rate of direct access electricity usage in Alameda County for 2005 (see Section 2.3 for more details on this calculation).

Table 3 summarizes GHG activity data changes in Pleasanton from 2005 to 2017.

Table 3 Summary of Pleasanton Activity Data Changes from 2005 to 2017

Raw Activity Data	2005 Activity Data	2017 Activity Data	Percent Change
Population	66,890	76,748	+15%
Residential Electricity (kWh)	209,630,848	182,355,696	-13%
Residential Gas (therms)	12,461,153	11,796,750	-5%
Direct Access Electricity (kWh)	55,674,114[1]	52,782,630	-5%
Nonresidential Electricity (kWh)	400,533,192	320,791,579	-20%
Nonresidential Gas (therms)	8,114,926	10,579,242	+30%
Wastewater (kWh)	4,546,080	3,671,304	-19%
Water (kWh)	20,975,856	15,344,462	-27%
Solid Waste (tons)	121,032	102,316	-15%
Average Daily Cover Waste (tons)	21.25	367	+1,627%
Passenger VMT	567,416,539	601,291,074	+6%
Commercial VMT	109,273,969	92,735,039	-15%
Passenger VMT Emission Factor ($MT CO_2e$/VMT)	0.000399	0.000338	-15%
Commercial VMT Emission Factor ($MT CO_2e$/VMT)	0.001470	0.001366	-7%
Off-Road Emission Factor (Effective Change in Service Population)	0.3149	0.0806	-74%
PG&E Electricity Factor ($MT CO_2e$/MWh)	0.000223	0.000096	-57%

$MT CO_2e$: metric tons of CO_2 equivalent; kWh: thousand-watt hours; MWh: million-watt hours;

[1] PG&E did not report data for direct access electricity usage in Pleasanton for 2005 and 2010 due to the 15-15 privacy rule from the CPUC. Direct access electricity usage was estimated for these years using the average rate of direct access electricity usage in Alameda County for 2005 (see Section 2.3 for more details on this calculation).

Progress Towards Pleasanton 2020 GHG Emissions Reduction Targets

The first Pleasanton Climate Action Plan was adopted in 2012.[19] It identified how the City and broader community can reduce Pleasanton's GHGs and included a GHG emissions reduction target of 15 percent reduction below 2005 emissions levels by 2020 or a total reduction of 121,970 MT CO_2e. According to the updated 2005 and 2017 inventories, Pleasanton exceeded the 2020 reduction goal three years ahead of schedule by decreasing emissions an estimated 154,456 MT CO_2e in 2017; this equates to an overall mass emissions reduction of 28 percent below 2005 levels.

The 2017 inventory and forecast also includes per capita emissions reductions to measure Pleasanton's GHG emissions reduction progress when accounting for the rate at which Pleasanton has grown since 2005. This will be useful for the City to reference if it chooses to adopt a per capita target pathway for future GHG emissions reductions (see the Provisional GHG Emissions Targets section below for more information regarding per capita efficiency target pathways). In 2005, GHG emissions were an estimated 12.2 MT CO_2e per person. This was calculated by dividing total GHG emissions from the updated 2005 GHG inventory by the by Pleasanton's 2005 population. In 2017, per capita emissions dropped to 7.7 MT CO_2e. This equates to a per capita emissions reduction of 37 percent below 2005 levels.

Future GHG Emissions Forecasts – 2020, 2025, 2030, 2040, 2045, 2050

A business-as-usual (BAU) future GHG emissions forecast provides a forecast of how GHG emissions would change over time if consumption and activity trends were to continue as they did in 2017, and if growth were to occur as projected in the City's 2005-2025 General Plan and Association of Bay Government's future demographic forecasts. This does not include emission reductions from any regulations which would reduce local emissions. BAU forecast results for 2020, 2025, 2030, 2040, 2045, and 2050 are provided in Table 4.

[19] Pleasanton, City of. 2012. Climate Action Plan. Available: <http://www.cityofpleasantonca.gov/gov/depts/os/env/cap/resources.asp>. Accessed: April 15, 2020.

Table 4 Summary of Pleasanton Business-as-Usual Future GHG Emissions Forecasts by Sector

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	18,206	18,496	19,005	20,116	21,229	22,404	23,644
Nonresidential Electricity	30,910	30,984	31,107	31,808	34,315	35,682	37,104	38,583
Direct Access Electricity	10,700	11,087	11,263	11,574	12,250	12,928	13,643	14,399
Residential Gas	62,647	64,913	65,945	67,762	71,719	75,689	79,879	84,301
Nonresidential Gas	56,181	56,315	56,539	57,813	62,369	64,855	67,440	70,128
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,785	1,803	1,849	1,974	2,069	2,169	2,275
Wastewater	1,190	1,214	1,227	1,258	1,343	1,408	1,476	1,548
On-Road Passenger Transportation	202,947	207,680	217,227	226,775	230,882	234,989	239,095	243,202
On-Road Commercial Transportation	126,668	126,797	131,035	135,273	140,210	145,147	150,084	155,021
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**600,774**	**622,079**	**646,644**	**676,918**	**703,457**	**730,555**	**758,242**
Emissions Per Capita	**7.67**	**7.55**	**7.70**	**7.79**	**7.70**	**7.59**	**7.47**	**7.34**

MT CO_2e: metric tons of carbon dioxide equivalent; T&D: Transmission and Distribution; Per capita based on population projections

Note: VMT data are provided by the MTC traffic demand model that are based on a variety of factors besides only projected demographic changes.

California has enacted multiple regulations that will reduce future local emissions. The impact of these regulations on GHG emissions have been incorporated into an *adjusted forecast*, which provides a more accurate picture of future emissions growth and the emission reduction the City and community will be responsible for after State regulations have been implemented. These State regulations include but are not limited to SB 100 (which sets a goal for reaching 100 percent electricity from renewable energy and zero-carbon sources by 2045) and California Air Resources Board (CARB) tailpipe emissions standards (Pavley Standards, Advanced Clean Cars Program).[20]

Calculating the difference between the adjusted forecast and the reduction targets set by the City determines the gap to be closed through City CAP policy implementation. Evaluating the percent change in the adjusted forecast from 2017 levels shows that Pleasanton's GHG emissions will decrease approximately 13 percent (76,834 metric tons) by 2030. Emissions will continue to decrease through 2040 but at a slower rate. Between 2030 and 2040 emissions will only decrease by an additional 2 percent from 2030 levels. This equates to a 15 percent (88,896 metric tons) decrease from 2017 levels in

[20] Refer to Section 4.2 of the Technical Appendix for the full list of State and federal legislation that was considered in the forecasting model.

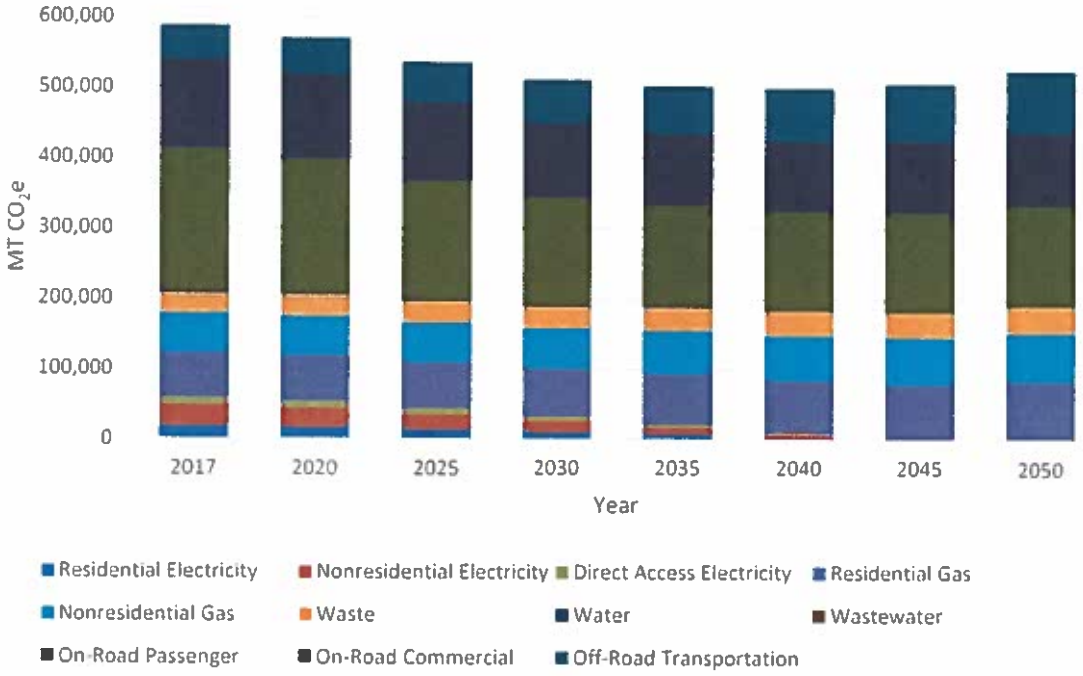
2040. The decreased rate of emissions reduction is due to current legislation being fully implemented by 2030, particularly Title 24 and California's vehicle efficiency standards. This causes expected growth to overcome emissions reductions over time. Emissions will then begin to increase again after 2040, with expected population and job growth outpacing the GHG emissions reductions resulting from the SB 100 zero-carbon electricity goal in 2045. This will lead to emissions being approximately 11 percent (63,994 metric tons) lower than 2017 levels in 2050. However, additional State legislation may be passed in the future that would mitigate these increases. The summary results of the adjusted future GHG emissions forecast are provided in Table 5 and shown in Figure 2.

Table 5 Summary of Pleasanton Adjusted Future GHG Emissions Forecasts by Sector

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	16,142	12,944	9,644	6,059	2,075	0	0
Nonresidential Electricity	30,910	27,657	22,175	16,785	11,249	4,955	0	0
Direct Access Electricity	10,700	9,931	8,145	6,335	4,213	1,836	0	0
Residential Gas	62,647	64,859	65,820	67,509	71,190	74,882	78,778	82,890
Nonresidential Gas	56,181	56,312	56,520	57,705	61,943	64,254	66,658	69,158
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,593	1,288	991	705	370	0	0
Wastewater	1,190	1,180	1,135	1,105	1,117	1,105	1,089	1,142
On-Road Passenger Transportation	202,947	190,764	168,825	153,381	143,608	140,208	140,267	141,752
On-Road Commercial Transportation	126,668	120,739	112,007	104,736	101,220	100,512	101,927	104,475
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**570,971**	**536,295**	**511,719**	**503,043**	**499,657**	**505,979**	**524,559**
Emissions Per Capita	**7.67**	**7.18**	**6.64**	**6.16**	**5.73**	**5.39**	**5.17**	**5.08**

MT CO_2e: metric tons of carbon dioxide equivalent; T&D: Transmission and Distribution; Per capita based on population projections

Figure 2 Pleasanton Adjusted Future GHG Emissions Forecasts by Sector



***Note:** As of the time of this writing, the federal Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part 2 has been posted in the Federal Register but will not take effect until June 29, 2020. This new rule rolls back California fuel efficiency standards for on-road passenger vehicles, so that cars and trucks will now only achieve a 40.4 mpg industry average by 2026 compared to the 46.7 mpg projected requirement under the previous California Advanced Clean Car Program/federal Corporate Average Fuel Economy (CAFE) standards. No methodology currently exists for extracting or altering the on-road passenger vehicles fuel efficiency standard aspect of the Emissions Factors (EMFAC) model[21] used to calculate forecasted vehicle GHG emissions. In addition, the California Climate Change Scoping Plan does not yet address or provide guidance related to this pending change in fuel efficiency standards with regard to GHG emissions determination. Furthermore, California is currently challenging this new rule in the court system. Therefore, the Pleasanton adjusted forecasts have not been modified to reflect the new SAFE Rule Part 2.*

[21] The EMFAC model is developed and used by CARB to assess emissions from on-road vehicles including cars, trucks, and buses in California and to support CARB regulatory and planning efforts to meet Federal Highway Administration transportation planning requirements.

Provisional GHG Emissions Targets – 2030, 2045, 2050

California currently has established goals for reducing GHG emissions by 40 percent compared to 1990 levels by 2030 (SB 32), achieving carbon neutrality by 2045 (EO B-55-18), and the previous executive order (S-03-05) that called for an 80 percent reduction from 1990 levels by 2050 . It is recommended that Pleasanton establish GHG emissions targets for the years 2025 (interim target), 2030 (SB 32 target year), 2040 (interim target), and 2045 (EO B-55-18 target year) - or if desired 2050 (EO S-3-05 target year) - to show compliance with these multiple-year State goals.

The City of Pleasanton has the ability to set GHG emissions reduction targets that suit its needs. However, to be considered a "Qualified GHG Reduction Plan" that can be used for California Environmental Quality Act (CEQA) GHG emissions analyses streamlining purposes pursuant to CEQA Guidelines Section 15183.8, the City should adopt a GHG emissions target that is at least as stringent as the State targets described above. Specifically, the City should target emission reductions of at least 40 percent below 1990 levels by 2030 and adopt a longer-term target of carbon neutrality by 2045 consistent with EO B-55-18 or 80 percent below 1990 levels by 2050 consistent with S-03-05. Currently both EOs remain in place; however, it appears that EO B-55-18 will likely be codified. The carbon neutrality target has been adopted by many other California cities in their CAP updates, and some jurisdictions, such as the Sacramento Metropolitan Air Management District, have adopted carbon neutrality as a CEQA GHG emissions significance threshold.[22]

The following discussion outlines the minimum GHG reduction targets required for CEQA GHG emissions analyses streamlining. However, Pleasanton can choose to adopt other GHG emissions reduction pathways that exceed these reductions and still maintain status as a Qualified GHG Reduction Plan under CEQA. Any target pathway that reduces less emissions by 2030 would not be considered consistent with the State goals. While more aggressive targets will initially require additional effort, a more stringent short-term goal (2030) may make it easier to reach longer-term goals like carbon neutrality.

There are several different methodologies for calculating these minimum GHG emissions reductions. The City could choose to adopt mass emission, per capita, or per service person targets. The Pleasanton 2012 CAP includes only mass emissions targets. Mass emission targets describe emissions in terms of total MT CO_2e without any adjustment for population growth. The most recent State Climate Change Scoping Plan (2017) includes guidance that details the methodology and benefits of developing per capita and per service person targets. The key benefit of a per capita target is that it corrects for population growth. This means that the target does not become more difficult to reach if the City grows faster than projected. Per capita emissions targets are developed by dividing the emissions in each target year by the forecasted population. Emission targets in both mass emissions and per capita emissions are discussed below.

[22] Sacramento Metropolitan Air Management District. 2020. Guide to Air Quality Assessment in Sacramento County. Available: <http://www.airquality.org/businesses/ceqa-land-use-planning/ceqa-guidance-tools>. Accessed: May 31, 2020.

Mass Emissions Pathways

The first proposed methodology for setting GHG emissions reduction target pathways is based on a total GHG emissions basis (i.e., mass emissions). This is the traditional methodology for establishing emissions targets as a part of CAP and was employed by the City for development of the 2020 target. The two pathways that meet CEQA Guidelines include:

1. **The SB 32/B-55-18 Mass Emissions Pathway.** This target pathway meets the minimum requirements for CEQA GHG emissions analyses streamlining. The pathway sets a 40 percent reduction from 1990 levels by 2030 and then carbon neutrality by 2045 consistent with EO B-55-18.
2. **The SB 32/S-03-05 Mass Emissions Pathway.** This target pathway meets the minimum requirements for SB 32. The pathway sets a 40 percent reduction from 1990 levels by 2030 but then adopts an 80 percent reduction by 2050 consistent with EO S-03-05.

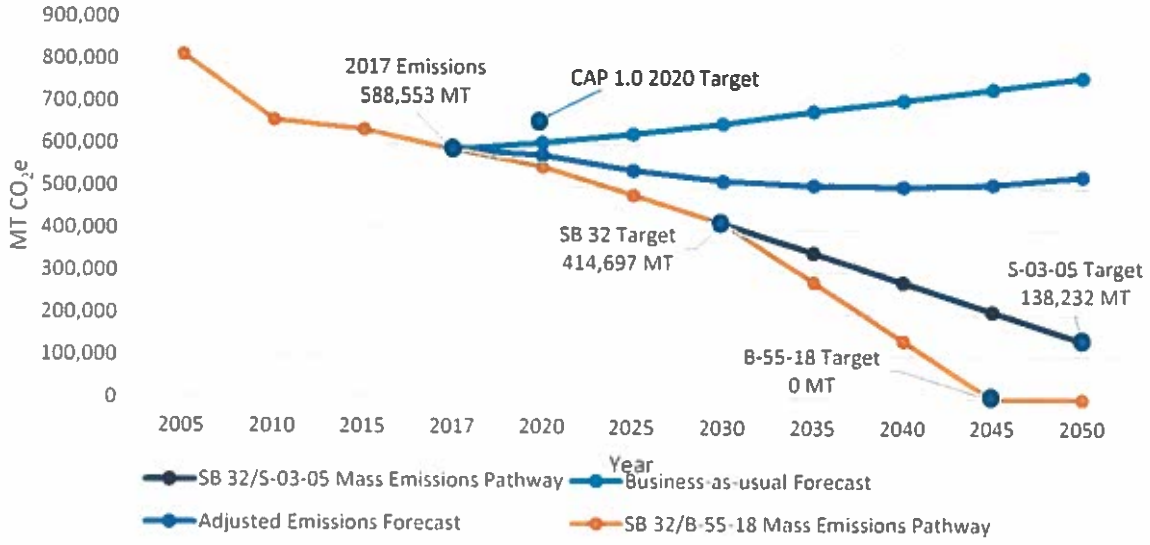
Table 6 provides GHG emissions targets for 2025, 2030, 2035, 2040, 2045, and 2050 for Pleasanton based on each of the SB 32/S-03-05 and SB 32/B-55-18 GHG mass emissions reduction target pathways. Figure 3 details the reduction necessary to achieve the mass emission targets in relation to the baseline inventory, business-as-usual forecast, and adjusted forecast. Forecasted emissions for 2020 are based off the 2017 inventory year, which already exceeds the original AB 32 target.

Table 6 Summary of Pleasanton Future Emissions Forecasts by Mass Reduction Target Pathway

Emissions Forecast	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Business-as-Usual Emissions Forecast	588,553	600,774	622,079	646,644	676,918	703,457	730,555	758,242
Adjusted Emissions Forecast	588,553	570,971	536,295	511,719	503,043	499,657	505,979	524,559
2045 SB 32 Mass Emissions Pathway	588,553	548,433	481,565	414,697	276,465	138,232	0	0
2050 SB 32 Mass Emissions Pathway	588,553	548,433	481,565	414,697	345,581	276,465	207,348	138,232

MT CO_2e: metric tons of carbon dioxide equivalent

Figure 3 Minimum Required Reduction Pathways for CEQA Streamlining (Mass Emissions)



Per Capita Emissions Pathways

Each of the above mass emission targets can also be expressed on a per capita basis (the second proposed methodology for setting GHG emissions reduction target pathways). Per capita targets are derived by dividing the mass emissions by the forecasted population in each target year. The benefit of per capita targets is primarily the ability to control for population growth over time. By adopting a per capita target, Pleasanton can continue to grow without sacrificing the ability to reach its GHG reduction goals.

1. **The SB 32/B-55-18 Per Capita Pathway.** This pathway translates the emissions targets referenced above under the mass emissions pathway into a per capita target by dividing each target year by the forecasted population. This pathway achieves a 40 percent reduction below 1990 levels by 2030 and then carbon neutrality by 2045.
2. **The SB 32/S-03-05 Per Capita Pathway.** This pathway translates the emissions targets referenced above under the mass emissions pathway into a per capita target by dividing each target year by the forecasted population. This pathway achieves a 40 percent reduction below 1990 levels by 2030 and then an 80 percent reduction below 1990 levels by 2050.

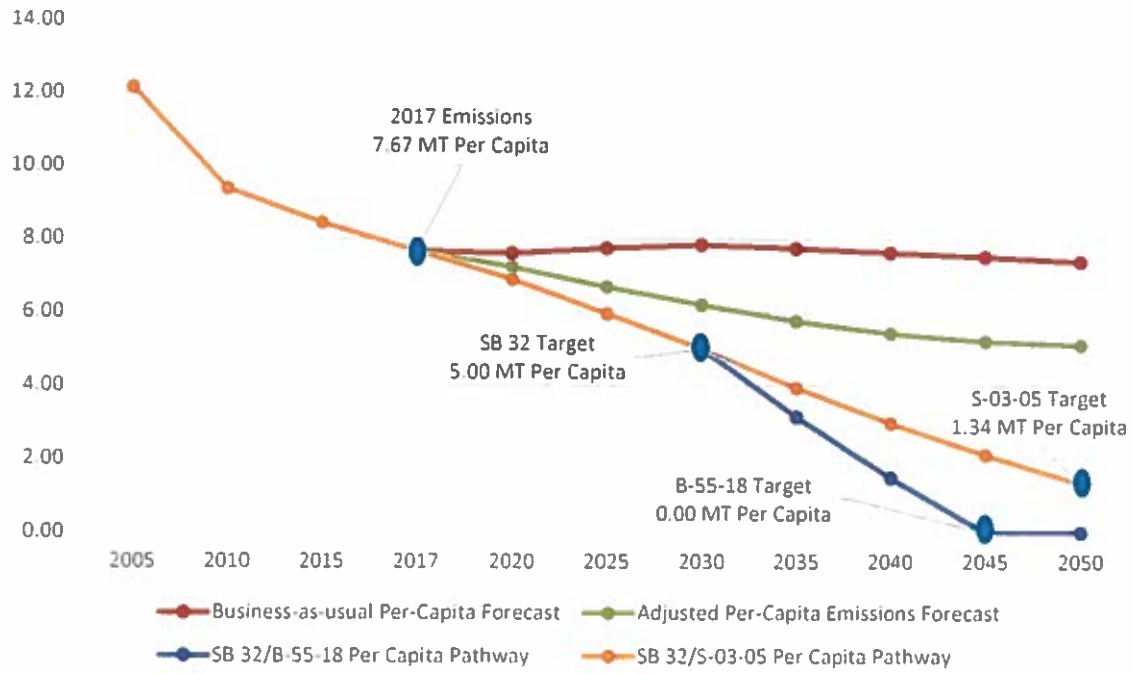
Table 7 provides per capita GHG emissions targets for 2025, 2030, 2035, 2040, 2045, and 2050 for Pleasanton based on the SB 32/S-03-05 and SB 32/B-55-18 GHG mass emissions reduction target pathways. Figure 4 details the GHG emission reduction necessary to achieve the per capita emission targets, in relation to the baseline inventory, business-as-usual forecast, and adjusted forecast.

Table 7 Summary of Pleasanton Future GHG Emissions Forecasts by Per Capita Efficiency Reduction Target Pathway

Emissions Forecast	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Business-as-Usual Per Capita Emissions Forecast	7.67	7.55	7.70	7.79	7.70	7.59	7.47	7.34
Adjusted Per Capita Emissions Forecast	7.67	7.18	6.64	6.16	5.73	5.39	5.17	5.08
SB 32/ B-55-18 Per Capita Pathway	7.67	6.90	5.96	5.00	3.15	1.49	0.00	0.00
SB 32/S-03-05 Per Capita Pathway	7.67	6.90	5.96	5.00	3.93	2.98	2.12	1.34

MT CO_2e: metric tons of carbon dioxide equivalent

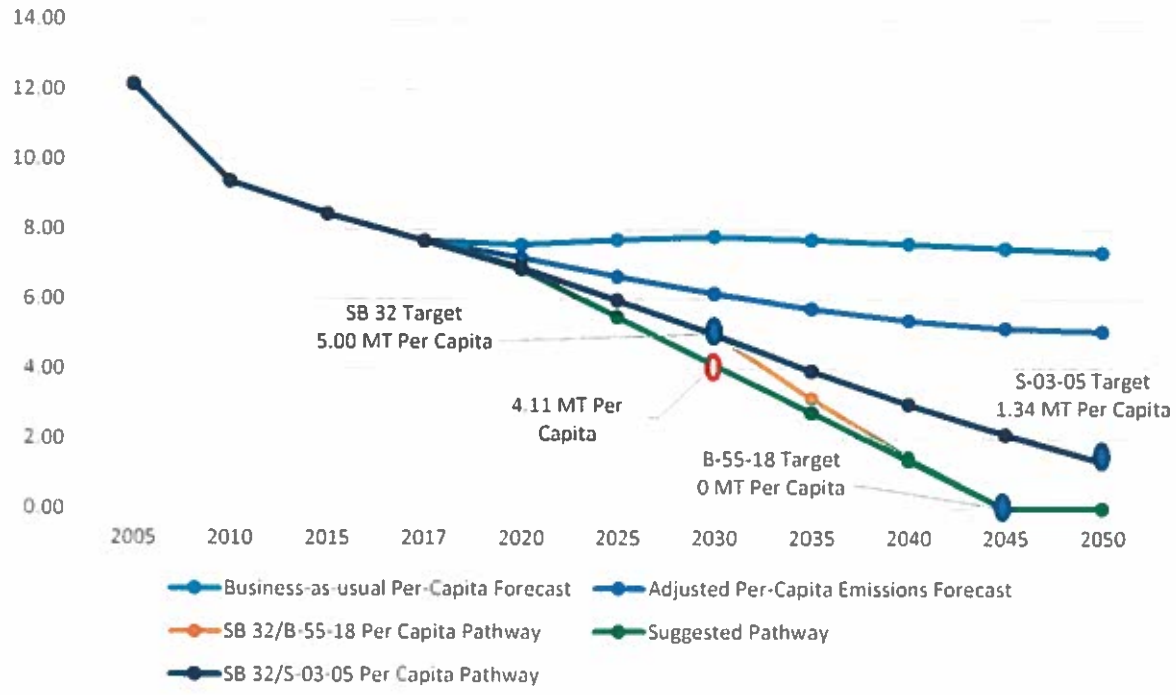
Figure 4 Minimum Required GHG Reduction Pathways for CEQA Streamlining (Per Capita Emissions)



Suggested GHG Emissions Reduction Pathway

The City of Pleasanton could adopt any of the GHG emissions target reduction targets discussed above for the CAP Update, as all of these pathways would comply with State emissions reduction goals and requirements for a CEQA Qualified GHG Reduction Strategy. However, the City could also choose to adopt a 2030 target on a straight-line trajectory from 2020 to 2045 that would provide for a more stringent GHG reduction target than what has been established for SB32, as detailed in Figure 5. This target may be more ambitious in the short term but could spur the upfront actions required to reach the longer-term State goal of carbon neutrality. The adoption of a per capita target is also suggested, due to the increased flexibility associated with controlling for population growth.

Figure 5 Suggested GHG Emissions Reduction Pathway Compared to Minimum CEQA-compliant Pathways (Per Capita Emissions)



Although this suggested pathway is more stringent than State goals, it offers the following key benefits:

- The per capita target is more flexible and allows for population growth over time;
- More stringent short-term targets could spur the adoption of significant actions and smooth the transition to carbon neutrality in the long term; and
- A target of carbon neutrality by 2045 will ensure CAP targets are consistent with longer-term future State targets.

Meeting the GHG Emissions Targets

The GHG emissions targets identified above will be achieved through implementation of local GHG emissions reduction measures that are to be identified within the Pleasanton CAP Update. Local measures will be identified through a comprehensive assessment of existing local and regional policies, programs, and actions and by assessing gaps and identifying additional opportunities. Additional measures will be developed from best practices worldwide and of other similar and neighboring jurisdictions, as well as those recommended by organizations and agencies, such as the California Air Pollution Control Officers Association (CAPCOA), Attorney General's office, and Air Resources Board. Measures will be vetted by City staff and the community and will be quantified to identify their overall contribution to meeting the Pleasanton GHG reduction targets.

Although the measures in the Pleasanton CAP Update will continue to achieve GHG emissions reductions after 2030 and establish a trajectory for reaching longer-term goals, another phase of climate action planning and the realization of additional technological advances and State measures will be needed to meet the longer-term targets. This next phase will build on the measures in the CAP Update, informed by monitoring and adaptive management, and take advantage of new technologies and climate protection science that will be available in the future.

If you have any questions about the GHG inventory, forecast, and targets methodology and calculations, please reach out to Ryan Gardner at rgardner@rinconconsultants.com or (510) 671-0177.

Sincerely,
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Environmental/Sustainability Sr. Program Manager

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Climate Action Program Manager

Attachment

GHG Inventory, Forecast, and Targets Methodology and Calculations Technical Appendix

Attachment 5

GHG Inventory, Forecast, and Targets Methodology and Calculations

Pleasanton Climate Action Plan Update

prepared for

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June 19, 2020

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1 Introduction

California considers greenhouse gas emissions (GHG) emissions and the impacts of climate change to be a serious threat to the public health, environment, economic well-being, and natural resources of the State and has taken an aggressive stance to mitigate the impact of climate change at the State-level through the adoption of legislation and policies. Many cities and counties within California have developed local climate action plans and aligned goals to correspond with State emissions reduction targets. The two major State GHG emissions-related goals are established by Assembly Bill (AB) 32 and Senate Bill (SB) 32. AB 32 required State agencies reduce State GHG emissions to 1990 levels by 2020, whereas SB 32 requires a 40 percent reduction below 1990 levels by 2030. The goals set by AB 32 were achieved even earlier by the State in 2016,[1] and many California jurisdictions are completing updated GHG inventories to quantify progress toward their specific 2020 goals as well as develop targets to align with the requirements of SB 32. There is also Executive Order B-55-18, which was passed in 2018 by Governor Jerry Brown and set a goal for achieving carbon neutrality Statewide by 2045. An older Executive Order (EO), EO S-3-05 (2005), which set a goal of 80 percent reduction in GHG emissions by 2050, is also considered in this technical appendix, but is generally considered superseded by the longer-term GHG emissions reduction goal set by EO B-55-18. These Executive Orders currently are only required by law for State Agencies, but future climate legislation and goals are expected by to be passed by the California legislature in the future.

This technical appendix details the methodology and results of the greenhouse gas (GHG) emissions inventories completed for Pleasanton, the forecast of future GHG emissions, and the provisional GHG emissions reduction targets identified for the Pleasanton Climate Action Plan (CAP) Update for the years 2030 (Senate Bill [SB] 32 target year), 2045 (Executive Order [EO] B-55-018 target year), and 2050 (EO S-3-05 target year). This technical appendix also quantifies the reduction impact that State regulations will have on Pleasanton's *business-as-usual forecast*[2] and presents the results in an *adjusted forecast.*[3] Target setting is an iterative process that must be informed by reductions that can realistically be achieved through development of feasible GHG reduction measures. As such, the targets identified herein (particularly the 2030, 2045, and 2050 targets) remain provisional until quantification and analysis of potential GHG reduction measures has been completed.

The City of Pleasanton has completed GHG emissions inventories[4] for 2010, 2015, and 2017 and updated the 2005[5] GHG inventory to measure progress toward the 2020 GHG reduction goals established in the first Pleasanton Climate Action Plan (CAP).[6] These inventories use the most recent population, employment, and emission factor data allowing for consistent and comparable methodologies across all inventory years and between Bay Area jurisdictions that are also using the

[1] California Air Resources Board. 2020. California Greenhouse Gas Emissions Inventory. Accessed: <https://ww3.arb.ca.gov/cc/inventory/inventory.htm>. Accessed: April 14, 2020

[2] Forecasts emissions based on population and job growth, with no reduction measures from federal, State, or local governments.

[3] The adjusted forecast scenario incorporates expected federal, State, and local GHG reduction measures into the emissions forecast to develop a more accurate forecast of emissions through 2045 and 2050.

[4] Note that all reference to inventories, forecasts, and targets in this memorandum are in reference to communitywide GHG emissions.

[5] The Updated 2005 GHG Emissions Inventory is an update of the previously prepared 2005 inventory that informed the first City CAP. This was done to use the most recent methodology, emission factors, and data sources available, as well as for consistency between other inventory years. The original updated 2005 inventory was created by East Bay Energy Watch, and then updated by Rincon (for more information on these updates, refer to Section 2.3 of the Technical Appendix).

[6] City of Pleasanton. 2012. City of Pleasanton Climate Action Plan. Available: <http://www.cityofpleasantonca.gov/gov/depts/os/env/cap/resources.asp>. Accessed April 14, 2020.

East Bay Energy Watch (EBEW) GHG calculation methodology. These various inventories will assist in the preparation of the Pleasanton CAP Update by tracking progress in specific GHG emission sectors and to forecast future GHG emissions and develop a respective gap analysis that will assist in identifying CAP Update policies that will achieve longer-term GHG emissions targets.

1.1 Regulatory Background

The State of California considers GHG emissions and the impacts of global warming to be a serious threat to the public health, environment, economic well-being, and natural resources of California, and has taken an aggressive stance to mitigate the State's contribution to climate change through the adoption of legislation, plans, and policies, the most relevant of which are summarized below.

- **Executive Order S-3-05 (2005),** signed by former Governor Schwarzenegger in 2005, establishes Statewide GHG emissions reduction goals to achieve longer-term climate stabilization as follows: by 2020, reduce GHG emissions to 1990 levels and by 2050, reduce GHG emissions to 80 percent below 1990 levels. The 2050 goal was accelerated by the 2045 carbon neutral goal established by Executive Order (EO) B-55-18, as discussed below.[7]
- **Assembly Bill 32 (2006),** known as the Global Warming Solutions Act of 2006, requires California's GHG emissions be reduced to 1990 levels by the year 2020 (approximately a 15 percent reduction from 2005 to 2008 levels). The AB 32 Climate Change Scoping Plan, first published in 2008, identifies mandatory and voluntary measures to achieve the Statewide 2020 emissions limit, and encourages local governments to reduce municipal and community GHG emissions proportionate with State goals.[8]
- **Climate Change Scoping Plan (2008),** the original California Climate Change Scoping Plan, includes measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted and implemented since approval of the Scoping Plan.
- **Climate Change Scoping Plan Update (2013),** the first update to the California Climate Change Scoping Plan, defines CARB climate change priorities for the next five years and set the groundwork to reach post-2020 Statewide GHG emissions reduction goals. The Scoping Plan Update highlighted California's progress toward meeting the 2020 GHG emission goals defined in the original Scoping Plan. It also evaluated how to align the State's longer-term GHG reduction strategies with other State policy priorities, including those for water, waste, natural resources, clean energy, transportation, and land use.
- **Executive Order B-30-15 (2015)** - Establishes Statewide GHG emissions reduction goals of reducing GHG emissions to 40 percent below 1990 levels by 2030
- **Senate Bill 32 (2016),** signed by former Governor Brown in 2016, codified the Statewide mid-term GHG reduction goal of 40 percent below 1990 levels by 2030. CARB formally adopted an updated Climate Change Scoping Plan in December 2017, laying the roadmap to achieve 2030 goals and giving guidance to achieve substantial progress toward 2050 State goals.

[7] Executive Orders are binding only unto State agencies. Accordingly, EO S-03-05 will guide State agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local government or private actions.

[8] Specifically, the AB 32 Climate Change Scoping Plan states CARB, "encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community emissions that parallel the State commitment to reduce GHG emissions by approximately 15 percent from current levels by 2020" (p. 27). "Current" as it pertains to the AB 32 Climate Change Scoping Plan is commonly understood as between 2005 and 2008.

- **Executive Order B-55-18 (2018),** signed by former Governor Brown in 2018, expanded upon EO S-3-05 by creating a Statewide GHG goal of carbon neutrality by 2045. EO S-55-18 identifies CARB as the lead agency to develop a framework for implementation and progress tracking toward this goal in the next Climate Change Scoping Plan Update.

The State of California, via CARB, has issued several guidance documents concerning the establishment of GHG emissions reduction targets for local climate action plans to comply with legislated GHG emissions reductions goals and CEQA Guidelines Section 15183.5(b). In the first California *Climate Change Scoping Plan,*[9] CARB encouraged local governments to adopt a reduction target for community emissions paralleling the State commitment to reduce GHG emissions. In 2016, the State adopted SB 32 mandating a reduction of GHG emissions by 40 percent from 1990 levels by 2030 and in 2017 CARB published *California's 2017 Climate Change Scoping Plan* (hereafter referred to as the Scoping Plan Update) outlining the strategies the State will employ to reach these targets.[10] With the release of the Scoping Plan Update, CARB recognized the need to balance population growth with emissions reductions and in doing so, provided a new methodology for proving consistency with State GHG reduction goals through the use of per capita efficiency targets. These targets are generated by dividing a jurisdiction's GHG emissions for each horizon year by the jurisdiction's total population for that target year and are discussed further in Section 5.

1.2 Baseline Inventory Greenhouse Gas Emissions

The 2017 Pleasanton GHG emissions inventory serves as the inventory to inform development of future GHG emissions forecasts that will assist the City in setting GHG emissions targets that are consistent with State-level goals and the Pleasanton General Plan 2005-2025. In 2017, Pleasanton GHG emissions were estimated to be 588,553 metric tons (MT) of carbon dioxide equivalent (CO_2e).[11] Data was originally gathered by EBEW and then reviewed and updated by Rincon for consistency with the latest methodology available in the Community Protocol[12] and California Supplement[13]. The updated 2005 GHG Inventory corrected a few typological errors in the water and wastewater inventory sectors and removed the Bay Area Rapid Transit (BART) emissions, because the City of Pleasanton does not have direct control over BART and is unable to reduce these emissions and because BART data was not available for the subsequent inventories. Emissions from nitrous oxide (N_2O), methane (CH_4), and carbon dioxide (CO_2) are included in this assessment. Each GHG has a different capability of trapping heat in the atmosphere, known as its global warming potential (GWP), which is normalized relative to CO_2 and expressed as carbon dioxide equivalent, or CO_2e. The CO_2e values for these gases are derived from the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change GWP values for consistency with the yearly CARB GHG inventory, as shown in Table 1.[14,15]

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[9] California Air Resources Board. 2008. Climate Change Scoping Plan. Available: <https://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf>. Accessed: April 14, 2020

[10] California Air Resources Board. California's 2017 Climate Change Scoping Plan. Available: <https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf>. Accessed: April 14, 2020

[11] Carbon dioxide equivalent is a term for describing GHG emissions in a common unit, signifying for any GHG the amount of CO_2 that would have the equivalent global warming impact. The equivalent amount of CO_2 is calculated based on the GHG global warming potential value.

[12] ICLEI. 2012. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Available: <https://icleiusa.org/publications/us-community-protocol/>. Accessed: April 14, 2020.

[13] Association of Environmental Professionals. 2013. The California Supplement to the United States Communitywide GHG Protocol. Available: <https://califaep.org/docs/California_Supplement_to_the_National_Protocol.pdf>. Accessed: April 14, 2020.

[14] Intergovernmental Panel on Climate Change. 2014. Fifth Assessment Report: Climate Change. Direct Global Warming Potentials.

[15] All calculations use Intergovernmental Panel on Climate Change Fifth Assessment Report GWP values.

Table 1 Global Warming Potentials of Greenhouse Gases

Greenhouse Gas	Molecular Formula	Global Warming Potential (CO_2e)
Carbon Dioxide	CO_2	1
Methane	CH_4	28
Nitrous Oxide	N_2O	265

MT CO_2e: metric tons of carbon dioxide equivalent

Included Emissions

The 2017 community inventory for the City of Pleasanton includes estimated emissions for the following sectors:

- Energy (electricity, natural gas, direct access electricity)
- On-road Transportation (passenger, commercial)
- Off-road Transportation
- Waste (solid waste, alternative daily cover)
- Water
- Wastewater (direct, indirect)

Excluded Emissions

The following emissions sectors were excluded from Pleasanton's CAP 1.0 inventory for 2005 and are also excluded from the updated 2005, 2010, 2015, and 2017 inventories. Additional updates were also made to the 2005, 2010, and 2015 inventories in order to maintain consistency between all inventory years. These changes are summarized in Sections 2.2 and 2.3.

Consumption-based Emissions

GHG emissions from consumption of goods within the city are excluded from the inventory and forecast of Pleasanton's emissions. This is due to no widely accepted standard methodology currently existing for reporting consumption-based inventories from CARB or the ICLEI U.S. Community Protocol.

Natural and Working Lands Emissions

GHG emissions from carbon sinks and sources in natural and working lands are not included in this inventory and forecast due to the lack of granular data and standardized methodology. CARB has included a State-level inventory of natural and working lands in the 2017 Scoping Plan Update[16] GHG inventory; however, at the time of this City of Pleasanton community-wide inventory, sufficient data and tools were not available to conduct a jurisdiction-specific working lands inventory. The Nature Conservancy and California Department of Conservation[17] are exploring options for a tool that may be able to perform these inventories at a more specific geographic level.

[16] California Air Resources Board. 2017. California Climate Change Scoping Plan Update.

[17] California Department of Conservation. TerraCount Scenario Planning Tool. Available: <https://maps.conservation.ca.gov/terracount/>. Accessed: April 15, 2020

Agricultural Emissions

Emissions from agricultural activities are not included in this inventory as the Community Protocol and California Supplement[18] both note agricultural activity is not a required component of Community Protocol inventories and should be included only if relevant to the community conducting the inventory. Regulations exist to encourage urban agriculture within the City boundaries. Many of the emissions from these activities (e.g. energy) are covered under other sectors included in this inventory and no major commercial-scale livestock activity is noted within the city boundaries.

High GWP Emissions

High GWP emissions, including chlorofluorocarbons (CFCs) and hydrofluorocarbons (HFCs) used as substitutes for ozone-depleting substances are not included in this inventory as it is not a required component of the Community Protocol and the California Supplement notes these emissions are not generally included in California inventories, including in Pleasanton. Furthermore, many of these emissions are from industrial manufacturing sources and are already accounted for in the California Cap-and-Trade program.

1.3 Future GHG Emissions Forecasts and Targets

Prior to 2018, the City of Pleasanton completed a communitywide GHG emissions inventory for the year 2005 and was used in their 2012 CAP 1.0. This was based on an emissions inventory completed in 2008 by ICLEI. The CAP 1.0 inventory also includes forecasts of 2020 and 2025 emissions, that was based on the current population, housing, and employment growth estimates available at the time. As part of the 2020 CAP Update, new GHG inventories were developed for the years 2005, 2010, 2015 and 2017 by EBEW using the most recent population, employment and emission factor data. These changes allowed for consistent and comparable methodologies across years and between jurisdictions who are using the EBEW GHG calculation methodology. This updated methodology made several changes to the 2005 inventory which resulted in changes to the overall GHG emissions in 2005 and 1990 (which is back cast from 2005). A complete description of the differences between the CAP 1.0 GHG inventory and the updated 2005 inventory is included in Section 2.3.

Future Pleasanton GHG emissions were forecasted for six different years (2020, 2025, 2030, 2040, 2045, and 2050) in terms of both a business-as-usual scenario[19] and an adjusted forecast scenario[20] in order to quantify expected emissions through 2050. In addition, five GHG emissions reduction target pathways are presented to establish 2025, 2030, 2035, 2040, 2045, and 2050 GHG emission reduction goals that may be adopted as part of the CAP Update.

This memorandum also summarizes the State GHG emissions targets, Pleasanton 2012 CAP emissions targets, provisional Pleasanton targets, and Pleasanton target pathway options to meet those targets. The provisional targets analyzed for the Pleasanton CAP Update include:

[18] Association of Environmental Professionals. 2013. The California Supplement to the United States Community-Wide Greenhouse Gas (GHG) Emissions Protocol. Available: <https://califaep.org/docs/California_Supplement_to_the_National_Protocol.pdf>. Accessed: April 15, 2020.

[19] Forecasts emissions based on population and job growth, with no reduction measures from federal, State, or local governments.

[20] The adjusted forecast scenario incorporates expected federal, State, and local GHG reduction measures into the emissions forecast to develop a more accurate forecast of emissions through 2045.

- Reduce GHG emissions a minimum of 15 percent below 2005 levels by 2020, which is consistent with Assembly Bill (AB) 32;[21]
- Reduce GHG emissions 40 percent below 1990 levels by 2030, which is consistent with SB 32[22] and in line with the reduction trajectory to achieve the State 2050 reduction goal (80 percent below 1990 levels) identified in Executive Order S-3-05;[23] and
- Reduce GHG emissions 80 percent below 1990 levels by 2050, consistent with Executive Order S-3-05 or achieve carbon neutrality by 2045, which is consistent with EO B-55-18.[24]

1.4 Progress Towards Pleasanton 2020 GHG Emissions Reduction Targets

The first Pleasanton Climate Action Plan was adopted in 2012.[25] It identified how the City and broader community can reduce Pleasanton GHGs and included a GHG emissions reduction target of 15 percent reduction below 2005 emissions levels by 2020 or a total reduction of 121,970 MT CO_2e. This target was consistent with the Statewide goal established by AB 32 in 2006 of reducing emissions to 1990 levels by 2020. This 15 percent reduction target was in line with current best practices at the time for the climate action plans developed for the County of Alameda and several Bay Area cities that also utilized 2005 baselines. According to the updated 2005 and 2017 inventories (which both use the same methodologies), Pleasanton exceeded the 2020 reduction goal three years ahead of schedule by decreasing emissions by an estimated 154,456 MT CO_2e, which equates to an overall mass emissions reduction of 28 percent below 2005 levels.

This 2017 inventory and forecast also considered per capita emissions reductions to measure Pleasanton's GHG emissions reduction progress when accounting for the rate at which Pleasanton has grown since 2005. This will be useful for the City to reference if it chooses to adopt a per capita target pathway for future GHG emissions reductions (see the Provisional GHG Emissions Targets section below for more information regarding per capita efficiency target pathways). In 2005, GHG emissions were an estimated 12.2 MT CO_2e per person. This was calculated by dividing total GHG emissions from the updated 2005 GHG inventory by the Pleasanton 2005 population. In 2017, per capita emissions dropped to 7.7 MT CO_2e per person. This equates to a per capita emissions reduction of 37 percent below 2005 levels. Details and discussion of previous inventories and changes made for consistency as part of this update can be found in Section 2.

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[21] AB 32 codified the State 2020 GHG emissions target by directing the California Air Resources Board (CARB) to reduce California's Statewide emissions to 1990 levels by 2020 (approximately equivalent to a 15 percent reduction from 2005 to 2008 levels). The AB 32 Scoping Plan encourages local governments to adopt a target that parallels the State target.

[22] SB 32 codified the State's 2030 GHG emissions target by directing CARB to reduce California's Statewide emissions to 40 percent below 1990 levels by 2030. CARB is currently working on a Scoping Plan to demonstrate how the State will achieve of the 2030 target.

[23] Executive Order S-3-05 established ambitious GHG reduction targets for the State: reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. SB 32 establishes a Statewide mid-term GHG reduction target of 40 percent below 1990 levels by 2030. To remain consistent with the trajectory of SB 32 and S-03-05, emissions would need to be reduced 40 percent below 1990 levels over the 20-year period between 2030 and 2050, which is equal to approximately 2 percent per year. Since 2035 is 5 years past 2030, emissions would need to be reduced by an additional 10 percent over the 2030 target, which is 50 percent below 1990 in 2035 (equivalent to 58 percent below 2008 levels).

[24] The Pleasanton Climate Action Plan Update will not include measures designed for implementation out to years 2045 or 2050 but rather present 2045 or 2050 forecast emissions and identify preliminary 2045 or 2050 targets to demonstrate the City commitment to achieve the City's fair share of GHG emissions of State long-term 2045 or 2050 goal presented in Executive Orders B-55-18 or S-3-05, respectively.

25 Pleasanton, City of. 2012. Pleasanton 2020 Climate Action Plan. Available: <http://www.cityofpleasantonca.gov/gov/depts/os/env/cap/resources.asp>. Accessed: April 2020.

2 Previous GHG Emissions Inventories

A summary of previous GHG emissions inventories prepared for Pleasanton can be found in Table 2. A description of the variability between methodologies used in each of the inventory years is summarized in the following sections.

Table 2 Pleasanton GHG Inventories Summary

Sector	1990[1] ($MT CO_2e$)	2005 CAP 1.0[2] ($MT CO_2e$)	2005 CAP 2.0[3] ($MT CO_2e$)	2010 ($MT CO_2e$)	2015 ($MT CO_2e$)
Residential Energy	96,013	113,565	112,957	110,603	91,334
Nonresidential Energy	130,864	151,860	153,958	133,401	122,438[4]
Direct Access Electricity	18,256	N/A	21,478	14,352	19,277
On-Road Transportation	328,919	401,550	386,963	367,968	340,830
Off-Road Transportation	99,506	25,410	117,067	19,205	48,262
Waste	30,172	38,826	35,497	21,912	27,063
Wastewater	1,319	N/A[5]	1,559	1,495	1,492
Water	4,361	34,426	5,130	4,090	3,820
Municipal Operations	N/A	5,370[6]	N/A	N/A	N/A
Total Emissions	**691,161**	**770,844**	**813,131**	**658,675**	**635,239**
Emissions per capita	13.7	11.5	12.2	8.44	8.38

$MTCO_2e$: metric tons of carbon dioxide equivalent

[1] All 1990 inventory data calculated as a 15 percent reduction from CAP 2.0 EBEW 2005 inventory levels per California Air Resources Board guidelines.

[2] Methodology inconsistent, cannot be compared directly to other years.

[3] EBEW inventory for 2005, using same methodology as 2010 and 2015 inventories. Used to back cast 1990 inventory numbers, and to compare emissions for 2017 inventory (CAP 2.0 baseline year).

[4] Nonresidential natural gas emissions adjusted to include estimated emissions from industrial sources, which were not reported by PG&E due to CPUC privacy rules.

[5] Wastewater emissions included with water emissions in original CAP 1.0 inventory.

[6] Municipal operations are a subset of community emissions (included in the community emissions inventory), in 2005 an inventory of municipal emissions was calculated separately for comparison purposes.

2.1 1990 Reference-Year Inventory

The State of California uses 1990 as a reference year to remain consistent with AB 32 and SB 32, which codified the State's 2020 and 2030 GHG emissions targets by directing CARB to reduce Statewide emissions to 1990 levels by 2020 and 40 percent below 1990 levels by 2030. The City of Pleasanton's initial inventory was conducted for the year 2005. The State indicated in the first Climate Change Scoping Plan in 2008 that local governments wishing to remain consistent with State targets could use a 15 percent reduction from 2005-2009 levels as a proxy for a 1990 baseline.[26] The updated 1990 proxy baseline used for target setting by Pleasanton is 691,161 MT CO_2e.[27]

2.2 CAP 1.0 2005 Inventory

In 2008, Pleasanton collaborated with ICLEI to develop a 2005 community GHG emissions inventory. The 2005 inventory quantified community emissions and forecast business-as-usual (BAU) conditions to 2020 based on expected population, employment, and growth. It included emissions from the residential energy, commercial/industrial energy, on-road transportation (using data from the Metropolitan Transportation Commission (MTC) for VMT data), and waste sectors.

In 2012, this 2005 inventory was updated to include additional sectors (referred to here as the CAP 1.0 2005 inventory) and develop forecasts of emissions for 2020 and 2025. The CAP 1.0 inventory added emissions from off-road vehicles, direct access electricity, water and wastewater systems, municipal operations, and utilized the Alameda County CMA Travel Demand Model (now known as Alameda CTC) for VMT estimates. This led to an overall 6.5% decrease in GHG emissions for the 2005 baseline inventory year compared to the original 2005 inventory completed by ICLEI.

The CAP 1.0 inventory from 2012 was updated as part of this current 2020 inventory and forecast effort for the CAP Update, using the most recent methodology, data, and emissions factors. This updated 2005 inventory for the CAP Update, along with inventories for 2010, 2015, and 2017, were originally developed by East Bay Energy Watch in 2019 and then updated by Rincon. (see section 2.3 below for more details on changes made by Rincon to these inventories).

Table 3 compares changes in emissions by sector between the previous CAP 1.0 2005 inventory and updated CAP 2.0 2005 inventory. Overall, emissions in the updated CAP 2005 inventory increased by 5 percent, mainly due to an increase in emissions from the off-road transportation sector.

[26] Due to lack of 1990 inventory data for local governments, page 27 of the 2008 Climate Change Scoping Plan identifies 15 percent below "current" (2005-2009) levels by 2020 as consistent with the State goals of 1990 levels by 2020, allowing local governments to back-cast to develop 1990 baselines for future GHG reduction targets.

[27] Calculated using updated 2005 CAP 2.0 inventory created by EBEW and completed by Rincon.

Table 3 GHG Emissions Comparison Between CAP 1.0 and CAP 2.0 2005 Inventories

	2005 CAP 1.0 Emissions (MT CO_2e)[28]	Updated 2005 CAP 2.0 Emissions (MT CO_2e)	Percent Change
Residential Electricity	46,881	46,782	-0.21%
Residential Gas	66,684	66,175	-0.76%
Nonresidential Electricity	105,107	89,385	-14.96%
Nonresidential Gas	46,753	43,094	-7.83%
Direct Access Electricity	N/A[1]	21,479	-
On-road Transportation	401,550	386,963	-3.63%
Off-road Transportation	25,410	117,067	+360.71%
Solid Waste Disposal	38,826[1]	35,497	-8.57%
Water and Wastewater	34,264	6,689	-80.48%
Municipal Operations	5,370	N/A[2]	-
Total	**770,884**	**813,131**	**+5.48%**

kWh: kilowatt hours; mgy: million gallons per year; N/A: not applicable; MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

1: Direct access electricity data included in nonresidential electricity category.

2: Municipal operations are a subset of community emissions in the updated 2005 CAP 2.0 inventory and were not calculated separately.

2.3 2005, 2010, 2015, and 2017 East Bay Energy Watch Inventories

In 2019, East Bay Energy Watch (EBEW) developed GHG inventories for jurisdictions across the Bay Area. GHG inventories for 2005, 2010, 2015, and 2017 were established for Pleasanton as a part of this effort (referred to from here as the EBEW inventories). Although the EBEW inventories use slightly different methodologies than the 2005 inventory, due to the availability of data, the consistency between years and between jurisdictions, and the use of the most recent emission factors and data sources, Pleasanton has adopted the EBEW inventories and will incorporate them into the CAP process.

The most significant differences between the EBEW inventories and CAP 1.0 2005 inventory is that the CAP 1.0 2005 inventory used the Alameda County Traffic Commission's Countywide Traffic Demand Model for VMT data modeling, while the EBEW CAP 2.0 inventories (2005, 2010, 2015, and 2017) utilize the Bay Area Metropolitan Transportation Commission (MTC) VMT data model for VMT data and projections. This led to a significant increase in on-road VMT activity data and on-road transportation emissions compared to the CAP 1.0 2005 inventory.

In addition, several updates were performed as part of the current effort to adjust the EBEW inventories specifically to Pleasanton and create a single methodology across the 2005, 2010, 2015, and 2017 inventories. These included adding natural gas emissions from the industrial sector in 2015 (due to the data being unavailable from PG&E reporting due to CPUC privacy rules) and updating the waste and water sections to better reflect the specific conditions in Pleasanton.

[28] Original 2005 CAP 1.0 inventory here refers to the 2012 CAP 1.0 inventory, which had previously been updated from ICLEI's 2005 inventory (completed in 2008 for use in Pleasanton's 2012 CAP 1.0).

The following discussion outlines the changes made to the EBEW inventories for consistency with the ICLEI Community Protocol[29] and inventory years.

Direct Access Electricity

Direct access electricity[30] was not reported by PG&E for the 2005 and 2010 reporting year due to California privacy rules, specifically what is known as the 15-15 rule[31]. It was determined by examining the available PG&E data for Pleasanton (obtained via PG&E's Green Communities portal) that direct access electricity users triggered the 15-15 rule for years before 2011. This prevented PG&E from reporting 2005 and 2010 direct access electricity activity data as a part of the data request for Pleasanton's energy data, which was listed as 'ZZZZZ'. This direct access electricity data was reported in all years between 2011 and 2017.

To allow for accurate comparison of energy sector emissions between inventory years, direct access electricity usage and emissions were estimated for 2005 and 2010. This was done by using the average rate of direct access electricity usage for Alameda County in 2005, which was 13.9 percent of nonresidential electricity.[32] The rate of 13.9 percent is lower than that seen in 2017 and therefore, may underestimate the use of direct access electricity in the baseline year. Therefore, this is considered a conservative estimate which would require additional reductions to meet the 40% reduction from 1990 levels. Direct access electricity usage was estimated in this way for 2005 and 2010, so direct access electricity emissions are accounted for across all four inventory years.

Natural Gas

When examining the available PG&E natural gas data for Pleasanton (obtained via PG&E's Green Communities portal) it was determined that large industrial natural gas users triggered the 15-15 rule in 2015. This prevented PG&E from reporting 2015 industrial natural gas activity data as a part of the data request for Pleasanton's energy data, which was listed as 'Fail-Dropped'. In other years, industrial natural gas emissions were included with commercial emissions.

To allow for accurate comparison of energy sector emissions between inventory years, industrial natural gas usage and emissions were estimated for 2015. This was done by calculating the ratio of commercial natural gas usage to residential natural gas usage in other reporting years (where industrial was included with commercial), and then the average ratio was applied to 2015 to estimate industrial natural gas usage in that year. The years 2013, 2014, 2016, and 2017 were used to calculate the average commercial/residential natural gas usage ratio, as these were the closest reporting years to 2015, and there was a clear upward trend in combined commercial and industrial natural gas usage after 2013. After applying this average to 2015, the estimated activity data for combined commercial and industrial natural gas usage was used to calculate emissions from the nonresidential natural gas sector in 2015 so industrial natural gas emissions are accounted for across all four EBEW inventory years.

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[29] ICLEI. 2013. U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.1

[30] Direct access electricity is retail electric service where customers purchase electricity from a competitive provider called an Electric Service Provider (ESP), instead of from a regulated electric utility. An ESP is a non-utility entity that offers electric service to customers within the service territory of an electric utility. The utility delivers electricity that the customer purchases from the ESP to the customer over its distribution system.

[31] The 15/15 rule states no data can be provided if there are less than 15 users in any sector or if one user makes up more than 15 percent of the total usage. This applies to natural gas and electricity consumption.

[32] Average rate of direct access electricity in Alameda County, as cited in Appendix A of 2012 City of Pleasanton Climate Action Plan 1.0.

Water and Wastewater

The original EBEW inventories included activity data and emissions from the water and wastewater sectors, which are standard to include in accordance with the ICLEI U.S. Community Protocol. Emissions were calculated using the following ICLEI Community Protocol methods (determined based on facility information gathered by EBEW): WW.2, WW.8, and WW.12. A typological error referencing the wastewater activity data was uncovered during Rincon's review and was corrected. In addition, during a review of the EBEW inventory and Dublin San Ramone Services District (DSRSD) operations, it was determined that wastewater from the DSRSD discharges to the bay via a main pipeline. The original EBEW inventory was set as discharging into rivers and streams, which underreported electricity consumption used to pump wastewater over the pass and into the bay. Therefore, Rincon updated the calculation to reflect this additional pumping. Once these errors were resolved, emissions for water and wastewater were calculated properly with no other further issues. For more detail on water and wastewater sector calculations, see Section 3.3.

BART

The EBEW inventories originally included emissions from Bay Area Rapid Transit (BART). It was decided by City staff and Rincon to ultimately remove these emissions from the four EBEW inventory years (2005, 2010, 2015, and 2017), similar to the City of Dublin that recently made the decision to remove BART emissions from its CAP. This was due to a lack of emissions data available for years after 2013, which prevented emissions from being accurately calculated and forecasted. All four inventory years used the same emissions factor, calculated based off of 2013 data and leading to inaccurate estimation of emissions. Pleasanton ultimately does not have control over reducing these emissions, and BART already has its own GHG emissions reduction goals in place over the next decade. These emissions also represented a small percentage of Pleasanton's overall emissions (0.45 percent in 2017). For these reasons, these emissions were ultimately removed.

Summary of Previous Year Inventories Data

Table 4 and Table 5 include all of the activity data, emission factors, and total GHG emissions available for both the original previous year inventories (Table 4) and the updated previous year inventories (Table 5).

Table 4 Original EBEW 2017 GHG Inventory Data

	Original Activity Data	Original Emission Factor	Original (MT CO_2e)
Residential Electricity (kWh)	182,355,696	0.000096	17,571
Residential Gas (therms)	11,796,750	0.00531	62,647
Nonresidential Electricity (kWh)	320,791,579	0.000096	30,910
Nonresidential Gas (therms)	10,579,242	0.00531	56,181
Direct Access Electricity	52,782,630	.000203	10,700
On-road Transportation (VMT)	694,026,113	0.000852	329,615
Off-Road Transportation	N/A[1]	.0946[2]	48,634
BART (Passenger Miles)	13,634,519	.000093	1,265
Solid Waste (tons)	102,316	0.286	21,006
ADC Waste (tons)	367	0.246	2046
Wastewater	0	.000096	878
Water (mgy)	4,600	.000096	1700
Total			**590,841**

kWh: kilowatt hours; mgy: million gallons per year; N/A: not applicable; MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

[1] Off-road emissions calculated as a proportion of total emissions in Alameda County based on changes in population and does not have activity data.

[2] Effective change in service population was defined as on the sum of new population and jobs in Pleasanton divided by the total sum of new jobs and population in Alameda County for each inventory year.

Table 5 Updated EBEW 2017 GHG Inventory Data

	Updated Activity Data	Updated Emission Factor	Updated (MT CO_2e)
Residential Electricity (kWh)	182,355,696	0.000096	17,571
Residential Gas (therms)	11,796,750	0.00531	62,647
Nonresidential Electricity (kWh)	320,791,579	0.000096	30,910
Nonresidential Gas (therms)	10,579,242	0.00531	56,181
Direct Access Electricity	52,782,630	.000203	10,700
On-road Transportation (VMT)	694,026,113	0.000852	329,615
Off-Road Transportation	N/A[1]	.0806[2]	48,634
BART (Passenger Miles)	Removed	Removed	Removed
Solid Waste (tons)	102,316	0.286	29,267
ADC Waste (tons)	367	0.246	90
Wastewater (mgy)	1,878	.000096	1,188
Water (mgy)	4,600	.000096	1,750
Total			**588,553**

kWh: kilowatt hours; mgy: million gallons per year; N/A: not applicable; MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

[1] Off-road emissions calculated as a proportion of total emissions in Alameda County based on changes in population and does not have activity data.

[2] Effective change in service population was defined as on the sum of new population and jobs in Pleasanton divided by the total sum of new jobs and population in Alameda County for each inventory year.

3 2017 GHG Emissions Inventory

The methodologies, data sources, calculations, and results associated with the Pleasanton community-wide 2017 GHG emissions inventory update are included in this section. The 2017 Pleasanton GHG emissions inventory serves as the inventory to inform development of future GHG emissions forecasts that will assist the City in setting GHG emissions targets that are consistent with State-level goals and the Pleasanton General Plan 2005-2025. In 2017, Pleasanton GHG emissions were estimated to be 588,553 metric tons (MT) of carbon dioxide equivalent (CO_2e). Data was originally gathered by EBEW and then reviewed and updated by Rincon for consistency with the latest methodology available in the Community Protocol[33] and California Supplement[34]. The updated 2005 GHG Inventory corrected a few typological errors in the water and wastewater inventory sectors and removed the Bay Area Rapid Transit (BART) emissions, because the City of Pleasanton does not have direct control over BART and is unable to reduce these emissions and because BART data was not available for the subsequent inventories. Information regarding updates to the original EBEW 2005, 2010, 2015, and 2017 inventories is included in Section 2.3, and information relating to the emissions forecast are located in Section 4 of this technical appendix.

The 2017 GHG inventory is structured based on emissions sectors. The ICLEI Community Protocol recommends local governments examine their emissions in the context of the sector responsible for those emissions. Many local governments will find a sector-based analysis more directly relevant to policy making and project management, as it assists in formulating sector-specific reduction measures for climate action planning. The reporting sectors are made up of multiple subsectors to allow for easier identification of sources and targeting of reduction policies.

The 2017 inventory reports all Basic Emissions Generating Activities[35] required by the Community Protocol[36] by the following main sectors:

- Energy (electricity and natural gas)
- Transportation
- Water and Wastewater
- Solid Waste

The data used to complete this inventory and forecast came from multiple sources, as summarized in Table 6. Data for the 2017 inventory calculations were provided by the City via personal communication with Megan Campbell, Associate Planner.

[33] ICLEI. 2012. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Available: <https://icleiusa.org/publications/us-community-protocol/>. Accessed: April 14, 2020.

[34] Association of Environmental Professionals. 2013. The California Supplement to the United States Communitywide GHG Protocol. Available: <https://califaep.org/docs/California_Supplement_to_the_National_Protocol.pdf>. Accessed: April 14, 2020.

[35] Required emissions generating activities include use of electricity by the community, use of fuel in residential and commercial stationary combustion equipment, on-road passenger and freight motor vehicle travel, use of energy in potable water and wastewater treatment and distribution, and generation of solid waste by the community.

[36] ICLEI. 2012. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Section 2.2.

Table 6 Inventory and Forecast Data Sources

Sector	Activity Data	Unit	Source
Inventory			
Energy	Electricity Consumption Natural Gas Consumption	kWh Therms	Pacific Gas and Electric
Transportation	Annual Mileage	VMT	Metropolitan Transportation Commission Vehicle Miles Traveled Data Portal; EMFAC2017 Model; OFFROAD2007
Water	Water Pumping Electricity Usage	AF kWh	Zone 7 Water; City of Pleasanton; Dublin-San Ramon Services District; Livermore Municipal Water
Wastewater	Electricity Consumption Water Treated	kWh MGD	Community Protocol Estimates, Dublin-San Ramon Services District
Solid Waste	N/A	N/A	CalRecycle; California Air Resources Board Landfill Emissions Tool Version 1.3
Forecast Growth Indicators			
Population	Residents	Persons	California Department of Finance E4 and E5 demographic datasets; Association of Bay Area Governments Plan Bay Area Projections 2040
Commerce	Jobs	Number of Jobs	California Department of Finance E4 and E5 demographic datasets; Association of Bay Area Governments Plan Bay Area Projections 2040
Transportation	Annual Mileage, Emissions	N/A	EMFAC2017 Model; Metropolitan Transportation Commission Vehicle Miles Traveled Data Portal
Building Efficiency	Title 24 Efficiency Increases	Percent	California Energy Commission
Electricity Emissions	Renewable Portfolio Standard	Percent	Renewable Portfolio Standard; Senate Bill 100

kWh; kilowatt hours; VMT: vehicle miles traveled; AF: acre-foot; MGD: million gallons per day; N/A: not applicable;

3.1 Energy Emissions

The energy sector includes GHG emissions resulting from the consumption of electricity and natural gas. Both energy sources are used in residential and nonresidential (commercial and industrial) buildings and for other power needs throughout the City of Pleasanton. The following subsections describe the data sources, emission factors and calculation methodologies associated with electricity and natural gas.

Overall, residential energy emissions were about equal to non-residential (commercial and industrial) in their contribution to energy emissions in 2017, at approximately 45 percent and 49 percent respectively (Figure 3). Direct access electricity accounted for the remaining 6 percent. It should be noted that, due to data availability issues in reporting years after 2013, large industrial gas data was not provided by PG&E and was instead estimated for 2015 and 2017 to allow for more accurate comparisons between inventory. Additional information on why this change was made as well as the methodologies used to estimate 2017 commercial gas data are provided in Section 2.3.

Electricity

Emissions resulting from electricity consumption were estimated by multiplying annual electricity consumed by an emission factor representing the average emissions associated with generation of one megawatt hour (MWh) of electricity. Electricity is supplied to the City by PG&E. In its 2017 report to the verification body, The Climate Registry, PG&E reported an electricity carbon intensity factor of 210 pounds CO_2e per MWh.[37] PG&E also reported to the California Energy Commission, an average of 33 percent renewable energy in its portfolio in 2017.[38] From 2005, residential electricity use decreased by 27,275 MWh while nonresidential electricity decreased by 79,742 MWh for a total net decrease of 107,017 MWh. Therefore, the 87,686 MT CO_2e reduction in GHG emissions from electricity between 2005 and 2017 was due to a decrease in electricity usage and an approximately 57 percent reduction in the PG&E electricity emission factor.

In 2017, a total 48,481 $MTCO_2e$ was generated within the community due to residential and commercial electricity use. Figure 3 and Table 12 show the breakdown of emissions from electricity by both category (residential, nonresidential) and by source.

Direct access electricity was also calculated using the same methodology, but with a calculated emissions factor of 0.203 MT CO_2e/MWh. This is equivalent to the California State grid (CAMX) average carbon intensity of electricity (reported by the California Energy Commission), as direct access electricity is not provided by PG&E.[39] Direct access electricity accounted for 52,783 MWh of electricity use in 2017, which resulted in 10,700 MT CO_2e of emissions..

Natural Gas

In order to calculate emissions from natural gas consumption, the total therms consumed is multiplied by the PG&E reported emissions factor of .00531 MT CO_2/therm, which remained constant across inventory years. Residential natural gas usage decreased from 12.5 million therms in 2005 to 11.8 million therms in 2017, and nonresidential natural gas usage increased from 8.1 million therms to 10.6 million therms. Overall, this resulted in a 9,558 MT CO_2e increase in emissions from the natural gas sector in 2005 compared to 2017.

In 2017, the residential and nonresidential sectors consumed a total of 22,375,992 therms of natural gas, which, based on the emission factor of 0.00531 MT CO_2/therms, generated 118,828 $MTCO_2e$. A complete breakdown of natural gas use by category and sector is provided in Figure 1 and Table 7.

[37] The Climate Registry. 2019 Default Emissions Factors. Available: <https://www.theclimateregistry.org/wp-content/uploads/2019/05/The-Climate-Registry-2019-Default-Emission-Factor-Document.pdf>. Accessed: April 15, 2020

[38] California Energy Commission. Pacific Gas and Electric Company 2017 Power Content Label. Available: <https://ww2.energy.ca.gov/pcl/labels/2017_labels/PG_and_E_2017_PCL.pdf>. Accessed: April 15, 2020

[39] California Energy Commission. Total System Electric Generation. Available: <https://ww2.energy.ca.gov/almanac/electricity_data/system_power/2017_total_system_power.html>. Accessed: May 7, 2020.

Figure 1 Energy Emissions by Category for Year 2017

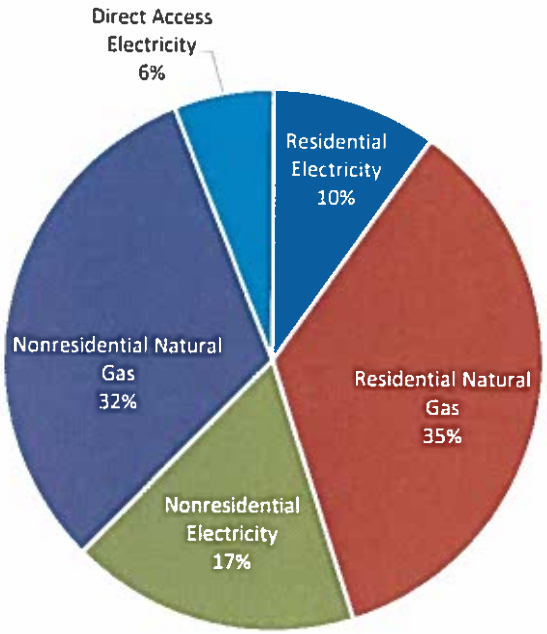

Table 7 Energy Emissions by Category for Year 2017

Source	Activity Data	Emission Factor	Total Emissions ($MTCO_2e$)
Residential			**80,218**
Natural Gas	11,796,750 therms	0.00531 MT CO_2e/therm	62,647
Electricity	182,356 MWh	0.09635 MT CO_2e/MWh	17,571
Nonresidential			**87,091**
Natural Gas	10,579,242 therms	0.00531 MT CO_2e/therm	56,181
Electricity	320,792 MWh	0.09635 MT CO_2e/MWh	30,910
Direct Access			**10,700**
Electricity	52,783 MWh	0.000203 MT CO_2e/MWh	10,700
Total			**178,009**

MWh: megawatt hours; MT CO_2e: metric tons of carbon dioxide equivalent

3.2 Transportation Emissions

On-Road

Transportation modeling for Passenger VMT attributed to the City of Pleasanton was obtained using the Bay Area Metropolitan Transportation Commission (MTC) VMT data model. The emissions associated with on-road transportation were then calculated by multiplying the estimated daily VMT and the average vehicle emissions rate established by CARB EMFAC2017 modeling for vehicles within the region. The MTC model does not directly provide VMT projections for 2017, so VMT was estimated by interpolating for years between 2015 and 2020 (for which VMT data is directly available from the MTC model). The MTC VMT modeling results allocate the total VMT derived from the activity-based model to using the Origin-Destination (O-D) method. The O-D VMT method is the preferred method recommended by the U.S Community Protocol in on-road methodology TR.1 and TR.2 to estimate miles traveled based on trip start and end locations. Under these recommendations, all trips that start and end within the City are attributed to the City. Additionally, one half of the trips that start internally and end externally and vice versa are attributed to the City, and no "pass through" trips are accounted for. Due to the MTC model not being able to provide VMT for unincorporated county areas, data was used from the Highway Performance Monitoring System,[40] which is published annually by Caltrans. This data provides VMT counts on local roads for each jurisdiction, as well as County-level VMT for all other roads (State highways, roads on land under State or federal jurisdiction such as military bases or State parks, etc.). This data includes all vehicle types and is allocated using the geographic boundary method.

Commercial VMT for heavy-duty vehicles is also provided by MTC, but separately from light-duty vehicles VMT.[41] Commercial VMT includes heavy-duty freight trucks, motor homes, public and private buses, and other commercial vehicles. Commercial VMT was assigned to individual communities by MTC using a method called "Longitudinal Employer-Household Dynamics" (LEHD). Under this method, MTC first models the county-wide VMT of heavy-duty vehicles using an approach called a geographical boundary method. In this method, all the heavy-duty VMT that occurs within a county's geographic limits is assigned to that county, regardless of where the trip begins or ends. MTC next looks at the number of jobs in specific economic sectors that generate heavy-duty vehicle trips (such as agriculture, construction, retail trade, and manufacturing) for the entire county and for each jurisdiction in the county. The US Census provides the number of jobs in these sectors through its online OnTheMap tool.[42] MTC sums the number of jobs in these sectors, and uses the percent of each community's share of jobs in these sectors, relative to the number of Alameda County jobs in the sectors, to allocate heavy-duty VMT. In 2017, Pleasanton was attributed 7.2 percent of the total commercial VMT in Alameda County, which was 3,553,565.

In 2017 on-road transportation in Pleasanton resulted in 329,615 MT CO_2e of emissions. This resulted in a 57,348 MT CO_2e reduction compared to 2005. During this time VMT increased by 2.6 percent or 17 million miles traveled and the emissions reductions in this sector were driven by an increase in average vehicle efficiency and adoption of electric vehicles. These changes drove the 17 percent decrease in average vehicles emissions per mile. A summary of the VMT results can be found in Table 8.

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[40] Caltrans. 2019. Highway Performance Monitoring System. Available: <https://dot.ca.gov/programs/research-innovation-system-information/highway-performance-monitoring-system>. Accessed: May 25, 2020

[41] East Bay Energy Watch. 2019. Regional Greenhouse Gas Inventory Methodological Summary. Available: <https://static1.squarespace.com/static/53fe4fcfe4b070b8a2eb623b/t/5c36664b21c67c309508c0ff/1547069004776/EBEW-RegionalGHGTool-Methodological-Summary.pdf>. Accessed: May 25, 2020.

[42] United States Census Bureau. 2018. OnTheMap Version 6. Available: <https://onthemap.ces.census.gov/>. Accessed: April 2020.

Table 8 Estimated On-Road Transportation Emissions for 2017

Source	Activity Data (VMT)[2]	Emission Factor	Total Emissions ($MTCO_2e$)
Internal-Internal Daily VMT	217,216	0.000445 MT CO_2e per VMT	97
½ Internal-External Daily VMT	472,942	0.000445 MT CO_2e per VMT	210
½ External-Internal Daily VMT	1,032,616	0.000445 MT CO_2e per VMT	459
Total Passenger Daily VMT	1,722,744	0.000338 MT CO_2e per VMT	522
Total Adjusted Passenger Daily VMT[3]	1,732,827	0.000338 MT CO_2e per VMT	582
Total Commercial Daily VMT	255,776	0.001366 MT CO_2e per VMT	349
Total Adjusted Commercial Daily VMT[3]	267,248	0.001366 MT CO_2e per VMT	365
Yearly Passenger VMT[1]	**601,291,074**	**0.000338 MT CO_2e per VMT**	**202,946**
Yearly Commercial VMT[1]	**92,735,039**	**0.001366 MT CO_2e per VMT**	**126,668**
Yearly VMT[1]	**694,026,113**	**.000852 MT CO_2e per VMT**	**329,615**

MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

[1] Weekday to annual conversion of 347 is used per CARB guidance on VMT modeling

[2] The origin-destination methodology for VMT calculation attributes 100 percent of internal to internal daily trips, 50 percent of internal-external and external-internal daily trips and excludes all pass-through trips. This sum is then multiplied by 347 to get an annual VMT number.

[3] Motorcycle, motor homes, and bus VMT not included in original data, and were estimated based on average prevalence of these vehicles in Alameda County, which is approximately 1 percent.

Transportation emissions are generated by the community of Pleasanton through on-road transportation, including passenger, commercial, and heavy machinery. Emissions factors are established using the latest CARB and EPA-approved emissions modeling software, 2017 State EMissions FACtors (EMFAC) Model. Carbon dioxide, nitrous oxide, and methane emissions from engine combustion are multiplied by their GWP to determine CO_2e per VMT. Emissions for both passenger and commercial vehicles were established using the EMFAC2017 GHG module and weighted by VMT to establish an average emissions factor per VMT for the City. Emissions from electricity used by charging of electric vehicles are captured under the electricity sector. In 2017, the average emissions factor for cars on the road in the County of Alameda was 0.000435 $MTCO_2e$ per VMT as calculated using the EMFAC2017 model.[43] Technical details on the EMFAC2017 modeling tool can be found on the EMFAC Mobile Source Emissions Inventory Technical Support Documentation Portal.[44]

[43] California Air Resources Board. 2017. EMFAC2017. Base year 2017, County of Alameda model run. Available: <https://www.arb.ca.gov/emfac/>. Accessed: April 5, 2020

[44] California Air Resources Board. 2017. EMFAC Software and Technical Support Documentation. Available: <https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-modeling-tools-emfac>. Accessed: April 5, 2020.

Off-Road

Off-road emissions were calculated using the California Air Resources Board's OFFROAD2007 modeling tool.[45] At the time of this inventory, the 2017 version of the tool was still not available. OFFROAD2007 was used to obtain emissions for Alameda County, shown below in Table 9. The proportion of emissions attributed to the City of Pleasanton was based on a ratio for effective change in service population, calculated to be 0.0806, using demographic data from the Department of Finance. The effective change in service population was calculated by taking the sum of new population and jobs in Pleasanton from 2016-2017 and dividing by the total sum of new jobs and population in Alameda County for 2016-2017. No change or decreases in a jurisdiction's demographic data were counted as zero. Demographic data used is shown below in Table 10. Total emissions from off-road transportation in 2017 was 58,852 MT CO_2e, shown in Table 11.

Table 9 Estimated Off-Road Emissions for Alameda County 2017

Source	CO_2/day	CH_4/day	N_2O/day	$MTCO_2e$/year
Agricultural Equipment	44.49	0.004043	0.000570	14,819.72
Airport Ground Support Equipment	52.53	0.005930	0.003753	17,777.87
Construction and Mining Equipment	1,181.69	0.101368	0.007014	392,841.72
Dredging	0.00	0.000000	0.000000	0.00
Entertainment Equipment	2.61	0.000115	0.000000	865.80
Industrial Equipment	292.98	0.088145	0.016153	99,248.92
Lawn and Garden Equipment	77.83	0.115765	0.050340	31,262.29
Light Commercial Equipment	159.90	0.041037	0.025518	55,567.60
Logging Equipment	0.00	0.000000	0.000000	0.00
Military Tactical Support Equip	0.00	0.000000	0.000000	0.00
Oil Drilling	2.11	0.000153	0.000000	698.51
Other Portable Equipment	0.04	0.000003	0.000000	13.94
Pleasure Craft	63.54	0.041389	0.013664	22,621.27
Railyard Operations	0.04	0.000002	0.000000	11.67
Recreational Equipment	11.18	0.096323	0.016988	6,087.09
Transport Refrigeration Units	182.23	0.014037	0.001260	60,581.77
Total	**2,071.17**	**0.508310**	**0.135259**	**702,398**

MT CO2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

[45] California Air Resources Board. 2007. OFFROAD2007. Available: <https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-archives>. Accessed: April 1, 2020.

Table 10 Department of Finance Demographic Data for Pleasanton 2016-2017

Source	Change in Population	Change in Jobs	Change in Service Population	Effective Change in Service Population
Pleasanton	910	947	1,857	1,857
Alameda County	16,667	4,305	20,972	23,036
Effective Change in Service Population Ratio for Pleasanton[1]	–	–	–	**0.0806**

Calculated: Pleasanton Effective Change in Service Population / Alameda County Effective Change in Service Population

Table 11 Estimated Off-Road Transportation Emissions for 2017

Source	Total Emissions 2017 (MT CO_2e)
Agricultural Equipment	69
Airport Ground Support Equipment	0
Construction and Mining Equipment	31,664
Dredging	0
Entertainment Equipment	40
Industrial Equipment	5,991
Lawn and Garden Equipment	1,447
Light Commercial Equipment	4,779
Logging Equipment	0
Military Tactical Support Equip	0
Oil Drilling	0
Pleasure Craft	1,055
Recreational Equipment	284
Transport Refrigeration Units	3,305
Total	**48,634**

MT CO_2e: metric tons of carbon dioxide equivalent

3.3 Water and Wastewater Emissions

Water

Water is primarily supplied to Pleasanton by Zone 7 Water Agency and local groundwater. Zone 7 supplies the City with about 80% of its water, which is mainly treated surface water from the State Water Project in the Central Valley blended with some local groundwater. The other 20% of Pleasanton's water comes from local groundwater, pumped from wells owned and operated by the City of Pleasanton.[46] In 2017, the City began using recycled water as well, from the City of Livermore and Dublin-San Ramon Services District (DSRSD).

Water supplied to the community contributes emissions through the use of energy to extract, convey, treat, and deliver water. The amount of energy required for community water usage was calculated using embodied energy data emission factors based on the processes used, taken from the California Energy Commission's 2007 Refining Estimates of Water-Related Energy Use in California report. It was determined that in 2017, Zone 7 provided water at an average of 4,037 kWh per million gallons, while City groundwater provides water at an average of 3,979 kWh per million gallons. Recycled water from the City of Pleasanton and DSRSD provided water at an average rate of 2,320 kWh per million gallons. This resulted in Zone 7 using 11,810 MWh to provide the City water in 2017, along with an additional 5,883 MWh from the City of Pleasanton, 402 MWh from DSRSD, and 51 MWh from the City of Livermore.

PG&E is the electricity provider for the City; therefore, PG&E's energy emissions factor of 210 pounds CO_2e/MWh was applied to the calculated electricity used for water consumption in the city. Energy consumption related to water use in the city of Pleasanton resulted in the generation of approximately 1,750 $MTCO_2e$ in 2017, or 60 percent of total water and wastewater emissions. In 2005, the City used 5,880 million gallons of water. In 2017, Pleasanton used 4,600 million gallons of water, or about 22 percent less overall. Emissions overall decreased by 3,380 MT CO_2e, due to this decrease in water usage as well as the reduction in PG&E's electricity emission factor.

Wastewater

The wastewater generated by community residents and businesses creates GHG emissions during the treatment processes, including process, stationary, and fugitive emissions. The sources and magnitude of emissions depend on the type of wastewater treatment plant and the treatment processes utilized.

Wastewater generated in the City of Pleasanton is collected in local sewer lines which ultimately discharge into the DSRSD Regional Wastewater Treatment Facility managed by DSRSD. The wastewater treatment plant treated 1,878 million gallons of sewage from Pleasanton in 2017, according to data obtained from the City. Emissions were calculated using Community Protocol Methodology WW.2, WW.8, and WW.12 based on processes used at the treatment facility, as shown in Figure 2. In 2017, a total of 3.07 MT N_2O and 2.29 MT CH_4 were emitted from the effluent discharge, process, and stationary sources at the treatment plant. The wastewater treatment plant also used 3,234,519 kWh of electricity to treat Pleasanton wastewater in 2017, which resulted in emissions of 310 MT CO2e. As shown in Table 12, the total process emissions and electricity usage for Pleasanton wastewater treatment and disposal resulted in emissions of 1,188 MT CO_2e per year, or 40 percent of the water and wastewater emissions.

[46] Pleasanton, City of. 2018 Annual Water Quality Report. Available: <http://www.cityofpleasantonca.gov/pdf/awqr18.pdf>. Accessed: April 26, 2020.

Table 12 Water and Wastewater Emissions for Year 2017

Source	Activity Data	Kilowatts per Million Gallons[1]	Kilowatt Hours	Emission Factor (MT CO_2e/MWh)	Total Emissions (MT CO_2e)
Water Use					**1,750**
Zone 7 Water Agency	2,925.82 MG	4,036.57	11,810,278	0.09635	1,138
City of Pleasanton	1,478.55 MG	3,978.75	5,882,769	0.09635	567
Dublin-San Ramon Services District	173.48 MG	2,320.00	402,481	0.09635	39
City of Livermore	21.89 MG	2,320.00	50,778	0.09635	5
Wastewater Generation					**1,188**
Dublin-San Ramon Services District[2]	1,878 MG	1,722	3,234,519	.09635	310
Process Nitrous Oxide Emissions	0.2574 MT N_2O	–	–	1 N_2O to 265 CO_2e	68
Stationary Methane Emissions	2.29 MT CH_4	–	–	1 CH_4 to 28 CO_2e	64
Effluent Discharge	2.814 MT N_2O	–	–	1 N_2O to 265 CO_2e	746
Total					**2,938**

MWh: megawatt hours; MT: metric tons; CO_2e: carbon dioxide equivalent; CH_4: methane; N_2O: nitrous oxide; MG: millions of gallons; kWh: kilowatt hours

[1] Calculated based off of the data regarding the processes used for water and wastewater generation. Water factors included: average depth of groundwater wells (575 ft), and sources of water (surface water, groundwater, State water project, recycled water). Wastewater factors included: type of wastewater treatment technology (activated sludge and digesters), use of pumps to dispose of wastewater, wastewater discharge into the San Francisco Bay, and number of septic tanks in Pleasanton (177 in 2017)

[2] Indirect emissions from electricity use during the wastewater generation process.

Figure 2 Wastewater Methodology

Box WW.2.(alt)	**Example Calculation of N_2OEmissions from Combustion when only Population Served by System is Known**	
A centralized wastewater facility serves a city with a population of 100,000 people. No other data is available. Based on this scenario the N_2O emissions from the combustion of digester biogas can be calculated as follows		
Description		Value
N_2O emissions	= Total N_2O emitted by combustion ($mtCO_2e$)	Result
P	= Population served by anaerobic digester	100,000
Digester gas	= Measured standard cubic feet of digester gas produced per person per day (std ft^3/person/day)	1.0
fCH_4	= Fraction of CH_4 in biogas	0.65
BTU_{CH4}	= Default BTU content of CH_4, higher heating value (BTU/ft^3)	1028
10^{-6}	= Conversion from BTU to 1 MMBTU	10^{-6}
EF_{N2O}	= N_2O emission factor (kg N_2O/MMBTU)	6.3×10^{-4} kg N_2O per MMBTU
365.25	= Conversion factor (day/year)	365.25
10^{-3}	= Conversion from kg to mt (mt/kg)	10^{-3}
GWP_{N_2O}	= Global Warming Potential; conversion from mt of N_2O into mt of CO_2 equivalents	GWP^{11}
Sample Calculation:		
Annual N_2O emissions = $(100{,}000 \times 1 \times 0.65 \times 1028 \times 10^{-6} \times (6.3 \times 10^{-4}) \times 365.25 \times 10^{-3}) \times 310$		
= 4.8 $mtCO_2e$		

***Equation WW.8* N_2O Process Emissions from Wastewater Treatment Plants (or aeration basin) without nitrification or denitrification**		
Annual N_2O emissions = $((P \times F_{ind\text{-}com}) \times EF \times 10^{-6}) \times GWP$		
Where:		
Description		Value
Annual N_2O emissions	= Total annual N_2O emitted by WWTP processes ($mtCO_2e$)	Result
P	= Population served by the WWTP	User input
$F_{ind\text{-}com}$	= Factor for high nitrogen loading of industrial or commercial discharge	1.25
$F_{ind\text{-}com}$	= Factor for insignificant industrial or commercial discharge	1
$EF_{w/o\ nit/denit}$	= Emissions factor for a WWTP without nitrification or denitrification(g N_2O/ person / year)	3.2
10^{-6}	= Conversion from g to mt (mt/g)	10^{-6}
GWP_{N_2O}	= Global Warming Potential; conversion from mt of N_2O into mt of CO_2 equivalents	GWP^{25}
Source: *As listed in LGO protocol Equation 10.7 from EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1890-2007, Chapter 8, 8-13 (2009)*		

***Equation WW.12.(alt)* N_2O Emission from Effluent Conversion when only Population Served by Wastewater Treatment Plant is Known**		
Annual N_2O emissions = ((P × $F_{ind\text{-}com}$) × (Total N load - N uptake x BOD5 load) × EF effluent × 44/28 × (1 – Fplant nit/denite) × 365.25 × 10^{-3}) × GWP		
Where:		
Description		Value
N_2O emissions	= Total annual N_2O emitted by effluent (mtCO2e)	Result
P	= Population	User input
$F_{ind\text{-}com}$	= Factor for industrial or commercial discharge	1.25 (if applicable)
Total N-Load	= Average total nitrogen per day (kg N/person/day)	0.026[34]
N uptake	= Nitrogen uptake for cell growth in *aerobic* systems (kg N/kg BOD_5)	0.05
OR		
N uptake	= Nitrogen uptake for cell growth in *anaerobic or lagoon* systems(kg N/kg BOD_5)	0.005
BOD_5	= Amount of BOD_5 produced per person per day (kg BOD_5/person/day)	0.090
EF	= Emission factor (kg N_2O-N/kg sewage-N discharged)	0.005 for river or stream discharge, 0.0025 for direct ocean discharge[35]
44/28	= Molecular weight ratio of N_2O to N_2	1.57
Fplant nit/denit	= Fraction of nitrogen removed from the WWTP with nitrification/denitrification	0.7
OR		
Fplant	= Fraction of nitrogen removed from the WWTP without nitrification/denitrification	0.0
365.25	= Conversion factor (day/year)	365.25
10^{-3}	= Conversion from kg to mt (mt/kg)	10^{-3}
GWP	= Global Warming Potential; conversion from mt of N_2O into mt of CO_2 equivalents	GWP[36]
Source: *As listed in LGO protocol Equation 10.10 from EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007, Chapter 8, 8-13 (2009); except Grady, C.P. L., Jr., G. T. Daigger, and H. C. Lim, Biological Wastewater Treatment p. 108-109, 644 2nd Edition (1999)*		

3.4 Solid Waste Emissions

GHG emissions result from management and decay of organic material solid waste. Community waste was calculated by determining lifetime methane emissions from solid waste generated by the community in the year of the inventory, using Community Protocol method SW.4[47]. This methodology attributes 100 percent of lifetime GHG emissions from the tonnage reported in the inventory year.

Waste from the City of Pleasanton went to 18 landfills in 2017 according to waste data obtained from CalRecycle. Data for the inventory was split between instate solid waste and alternative daily cover waste, 102,316 tons and 367 tons respectively. Waste data from one landfill site was not included in the inventory (Covanta Stanislaus, Inc.), because it only received a small quantity of 'transform waste', and there was no instate waste or alternative daily cover waste reported. Activity data for the waste sector of the GHG inventory is shown below in Table 13 by landfill destination.

Table 13 Summary of Solid Waste Activity Data by Landfill for Year 2017

Source	Solid Waste (tons)	ADC Waste (tons)
Landfills		
Altamont Landfill & Resource Recovery	2,173	143
Antelope Valley Public Landfill	1	0
Azusa Land Reclamation Co. Landfill	7	0
Corinda Los Trancos Landfill (Ox Mtn)	4	0
Fink Road Landfill	138	0
Foothill Sanitary Landfill	45	0
Forward Landfill, Inc.	1,158	0
Guadalupe Sanitary Landfill	6	0
Keller Canyon Landfill	232	135
Kirby Canyon Recycle. & Disp. Facility	5	0
Monterey Peninsula Landfill	258	0
Newby Island Sanitary Landfill	47	0
North County Landfill & Recycling Center	2	0
Potrero Hills Landfill	26	0
Recology Hay Road	713	0
Vasco Road Sanitary Landfill	97,492	79
Zanker Material Processing Facility	9	10
Total Tons of Waste Disposal	**102,316**	**367**

Communities are required to estimate the emissions resulting from waste disposed by the community (SW.4.1)[39], regardless of whether the receiving landfill(s) are located inside or outside of the community boundary. Community Protocol Method SW.4.1[39] is summarized in Figure 3, utilizing mass of waste being disposed, organic content of waste, methane capture ability of the landfill, oxidation rate, and methane GWP. The 2017 emissions factor for generated solid waste and ADC waste in

[47] ICLEI. 2012. US Community Protocol. Available: <https://icleiusa.org/publications/us-community-protocol/>. Accessed: May 1, 2020.

Pleasanton was derived from the California Air Resources Board California Landfill Emissions Tool Version 1.3, shown in Table 14 and Table 15 respectively.

Figure 3 Waste Generation Methodology

Equation SW.4.1 Methane Emissions

$$CH_4\ Emissions = GWP_{CH4} * (1 - CE) * (1 - OX) * M * \sum_i P_i * EF_i$$

Where:

Term	Description	Value
CH_4 emissions	= Community generated waste emissions from waste M ($mtCO_2e$)	Result
GWP_{CH4}	= CH_4 global warming potential	
M	= Total mass of waste entering landfill (wet short ton)	User Input
P_i	= Mass fraction of waste component i	User Input
EF_i	= Emission factor for material i ($mtCH_4$/wet short ton)	Table SW.5
CE	= Default LFG Collection Efficiency	No Collection, 0 Collection, 0.75
OX	= Oxidation rate	0.10

Source: As developed by ICLEI staff and Solid Waste Technical Advisory Committee. Emissions factors from U.S. EPA Municipal Solid Waste Publication (2008) available at http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw2008data.pdf

In 2017, Pleasanton produced 102,316 tons of solid waste and 367 of ADC waste.[48] A CO_2e emissions factor for mixed-waste of 0.286 MT CO_2e/ton was established and multiplied by the total solid waste disposed of from the community to calculate emissions from waste generated in 2017 of 29,267 MT CO_2e. For ADC waste, a CO_2e emissions factor of 0.246 MT CO_2e/ton was established and multiplied by the total ADC waste disposed of from the community to calculate emissions from waste generated in 2017 of 90 MT CO_2e. These emissions factors include the expected lifetime emissions associated with the specified tonnage of waste sent to landfill. The emissions factors were developed using SW 4.1 as well as the relative waste stream percentages of different organic materials to establish a methane emissions factor. From 2005 to 2017 GHG emissions from community waste decreased by 6,139 MT of CO_2e. This was due to a combination of factors including a reduced solid waste emission factor as well as an overall reduction in waste generation of 18,370 tons. Total waste emissions for 2017 are summarized in Table 16.

[48] CalRecycle. 2017. Local Government Information Center. Available: <https://www.calrecycle.ca.gov/LGCentral/MyLoGIC/>. Accessed: April 20, 2020.

Table 14 California Default Solid Waste Characterization[1]

Waste Type	WIPFRAC	TDOC	DANF	ANDOC	Weighted MT CO_2e/ton
Newspaper	1.44%	47.09%	15.05%	0.12%	0.279029616
Office Paper	0.73%	38.54%	87.03%	0.62%	1.320583313
Corrugated Boxes	3.13%	44.84%	44.25%	0.95%	0.781203158
Coated Paper	12.10%	33.03%	24.31%	0.72%	0.316139414
Food	18.12%	14.83%	86.52%	1.99%	0.505176074
Grass	1.84%	13.30%	47.36%	0.12%	0.247998153
Leaves	3.52%	29.13%	7.30%	0.07%	0.083723708
Branches	3.27%	44.24%	23.14%	0.20%	0.403054324
Lumber	11.91%	43.00%	23.26%	1.45%	0.393788725
Textiles	5.85%	24.00%	50.00%	0.66%	0.472461427
Diapers	4.29%	24.00%	50.00%	0.52%	0.472461427
Construction/Demolition	2.31%	4.00%	50.00%	0.11%	0.078743571
Medical Waste	0.11%	15.00%	50.00%	0.00%	0.295288392
Sludge/Manure	0.57%	5.00%	50.00%	0.00%	0.098429464
MSW Total				**7.52%**	**0.28604673**

[1]The static values here are from the California Landfill Emissions Tool Version 1.3

Table 15 Alternative Daily Cover Waste Characterization[1]

Waste Type	WIPFRAC	TDOC	DANF	ANDOC	Weighted MT CO_2e/ton
Newspaper	0.00%	47.09%	15.05%	0.12%	0.279029616
Office Paper	0.00%	38.54%	87.03%	0.62%	1.320583313
Corrugated Boxes	0.00%	44.84%	44.25%	0.95%	0.781203158
Coated Paper	0.00%	33.03%	24.31%	0.72%	0.316139414
Food	0.00%	14.83%	86.52%	1.99%	0.505176074
Grass	50.00%	13.30%	47.36%	0.12%	0.247998153
Leaves	25.00%	29.13%	7.30%	0.07%	0.083723708
Branches	25.00%	44.24%	23.14%	0.20%	0.403054324
Lumber	0.00%	43.00%	23.26%	1.45%	0.393788725
Textiles	0.00%	24.00%	50.00%	0.66%	0.472461427
Diapers	0.00%	24.00%	50.00%	0.52%	0.472461427
Construction/Demolition	0.00%	4.00%	50.00%	0.11%	0.078743571
Medical Waste	0.00%	15.00%	50.00%	0.00%	0.295288392
Sludge/Manure	0.00%	5.00%	50.00%	0.00%	0.098429464
MSW Total				**7.52%**	**0.245693584**

[1]The static values here are from the California Landfill Emissions Tool Version 1.3

Table 16 Summary of Solid Waste Activity Data for Year 2017

Source	Tons	Emission Factor (MT CO_2e/ton)	Total Emissions (MT CO_2e)
Solid Waste	102,316	0.286	29,267
ADC Waste	367	0.246	90
Total Waste Emissions	–	–	**29,358**

MT CO2e: metric tons of carbon dioxide equivalent

3.5 2017 GHG Emissions Inventory Results Summary

The 2017 Pleasanton GHG emissions inventory serves as the inventory to inform development of future GHG emissions forecasts that will assist the City in setting GHG emissions targets that are consistent with State-level goals and the Pleasanton General Plan 2005-2025. Overall emissions for the City of Pleasanton were estimated to be 588,553 MT CO_2e in 2017. The on-road transportation sector (passenger and commercial vehicles) was the largest emissions sector with 56 percent of total 2017 baseline inventory emissions, followed by natural gas use in the energy sector at 21 percent. Off-road transportation emissions were estimated to be 8 percent of emissions, and waste emissions accounted for 5 percent. The smallest emissions sector was water and wastewater, which combine to account for less than 1 percent of total 2017 emissions for the City of Pleasanton. Emissions are summarized in Figure 4 and Table 17 below.

Figure 4 2017 City of Pleasanton Community Emissions by Sector

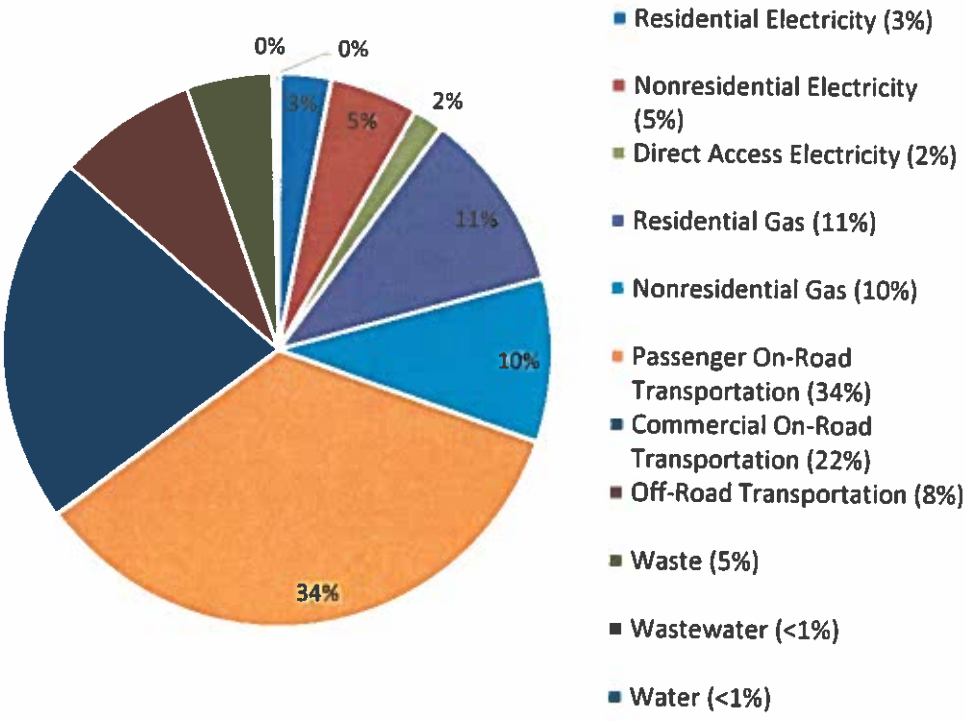

Table 17 2017 GHG Inventory

Sector	Activity Data	Emission Factors	Units	MT CO_2e
Residential Electricity (kWh)	182,355,696	0.0000963549	MT CO_2e/kWh	17,571
Nonresidential Electricity (kWh)	320,791,579	0.0000963549	MT CO_2e/kWh	30,910
Direct Access Electricity (kWh)	52,782,630	0.0002027	MT CO_2e/kWh	10,700
Residential Gas (therms)	11,796,750	0.00531	MT CO_2e/therms	62,647
Nonresidential Gas (therms)	10,579,242	0.00531	MT/CO_2e/therms	56,181
Passenger On-Road Transportation (VMT)	601,291,074	0.000338	MT CO_2e/mile	202,947
Commercial On-Road Transportation (VMT)	92,034,058	0.001366	MT CO_2e/mile	126,668
Off-Road Transportation (VMT)	N/A[1]	0.0806[2]	Effective Change in Service Population	48,634
Waste (tons)[4]	102,683	0.2860	MT CO_2e/Ton	29,357
Wastewater (kWh)	N/A[3]	N/A[3]	MT CO_2e/kWh	1,180
Water (kWh)	18,146,306	0.00009635	MT CO_2e/kWh	1,750
Total Emissions				**588,553**

MWh: megawatt hours; kWh: kilowatt hours; CO_2e: carbon dioxide equivalent; MT: metric tons; VMT: vehicle miles traveled; ADC: Alternative Daily Cover

[1] Off-road emissions calculated as proportion of total Alameda County emissions based on changes in population; doesn't have activity data.

[2] Effective change in service population was defined as on the sum of new population and jobs in Pleasanton divided by the total sum of new jobs and population in Alameda County for each inventory year.

[3] Wastewater is a combination of stationery and process emissions, further detail is Section 3.3.

[4] Includes a small quantity (367 tons) of Alternative Daily Cover Waste, for which a different emission factor was used (.246 MTCO_2e/ton). This emissions factor was calculated using data from CARB's California Landfill Emissions Tool Version 1.3.

Between 2005 and 2017, Pleasanton experienced a population increase of 15 percent but a per capita emissions reduction of 37 percent. This translates to a 28 percent reduction in total Pleasanton GHG emissions from 2005 to 2017, which exceeds the GHG emission target established in the 2012 CAP. Table 18 summarizes GHG emission changes in Pleasanton from 2005 to 2017, and Table 19 summarizes changes in activity data.[49] Between 2005 and 2017, Pleasanton reduced GHG emissions in every sector except for nonresidential gas, which may have increased due to growth in development of the commercial and industrial sectors within the City. Major GHG emissions reductions were achieved in the waste and wastewater sectors, although these sectors make up smaller proportions of overall Pleasanton emissions as shown in Figure 4. It is worth noting that large GHG emissions reductions from electricity usage were driven largely by PG&E's electricity fuel mix, which saw a significant decrease in carbon intensity[50] from 2005 to 2017. Although there was an increase in passenger vehicle miles traveled (VMT), GHG emissions associated with the passenger on-road transportation sector declined because of the increased fuel efficiency of vehicles as detailed in Tables 18 and 19.[18]

[49] Table 17, Table 18, Table 19, and Figure 4 may present data in different ways, but they are summarizing the same data. On-road transportation includes both passenger and commercial on-road transportation.

[50] Carbon intensity is the amount of carbon by weight emitted per unit of energy consumed. For example, as the percentage of renewable energy sources used to produce electricity increases, the carbon intensity of that electricity decreases.

Table 18 Summary of Pleasanton GHG Emissions Changes from 2005 to 2017

	2005 (MT CO_2e)	2017 (MT CO_2e)	Percent Change
Residential Electricity	46,782	17,571	-62%
Nonresidential Electricity	89,385	30,910	-65%
Direct Access Electricity	21,479[1]	10,700	N/A
Residential Gas	66,175	62,647	-5%
Nonresidential Gas	43,094	56,181	+30%
Waste	35,497	29,358	-17%
Water	5,130	1,750	-66%
Wastewater	1,559	1,180	-24%
On-Road Transportation	386,963	329,615	-15%
Off-Road Transportation	117,067	48,634	-58%
Total Emissions	**813,131**	**588,553**	**-28%**
Emissions Per Capita	**12.2**	**7.7**	**-37%**

MT CO_2e: metric tons of CO_2 equivalent

[1] PG&E did not report data for direct access electricity usage in Pleasanton for 2005 and 2010 due to the CPUC's 15-15 privacy rule. Direct access electricity usage was estimated for these years using the average rate of direct access electricity usage in Alameda County for 2005 (see Section 2.3 for more details on this calculation).

Table 19 summarizes GHG activity data changes in Pleasanton from 2005 to 2017.

Table 19 Summary of Pleasanton Activity Data Changes from 2005 to 2017

Raw Activity Data	2005 Activity Data	2017 Activity Data	Percent Change
Population	66,890	76,748	+15%
Residential Electricity (kWh)	209,630,848	182,355,696	-13%
Residential Gas (therms)	12,461,153	11,796,750	-5%
Direct Access Electricity (kWh)	55,674,114[1]	52,782,630	-5%
Nonresidential Electricity (kWh)	400,533,192	320,791,579	-20%
Nonresidential Gas (therms)	8,114,926	10,579,242	+30%
Wastewater (kWh)	4,546,080	3,671,304	-19%
Water (kWh)	20,975,856	15,344,462	-27%
Solid Waste (tons)	121,032	102,316	-15%
Average Daily Cover Waste (tons)	21.25	367	+1,627%
Passenger VMT	567,416,539	601,291,074	+6%
Commercial VMT	109,273,969	92,735,039	-15%
Passenger VMT Emission Factor (MT CO_2e/VMT)	0.000399	0.000338	-15%
Commercial VMT Emission Factor (MT CO_2e/VMT)	0.001470	0.001366	-7%
Off-Road Emission Factor (Effective Change in Service Population)	0.3149	0.0806	-74%
PG&E Elec Factor (MT CO_2e/MWh)	0.000223	0.000096	-57%

MT CO_2e: metric tons of CO_2 equivalent; kWh: thousand-watt hours; MWh: million-watt hours,

[1] PG&E did not report data for direct access electricity usage in Pleasanton for 2005 and 2010 due to the 15-15 privacy rule from the CPUC. Direct access electricity usage was estimated for these years using the average rate of direct access electricity usage in Alameda County for 2005 (see Section 2.3 for more details on this calculation).

4 Future GHG Emissions Forecasts

A GHG emissions inventory sets a reference point for a single year. However, annual emissions change over time due to factors such as population and job growth as well as new technologies and policies. A GHG emissions forecast accounts for projected growth and presents an estimate of GHG emissions in future years. Calculating the difference between the GHG emissions forecast and the GHG emissions reduction targets set by a jurisdiction determines the gap that needs to be closed through the jurisdiction's climate action plan policies. This section calculates an emissions forecast for the City of Pleasanton through 2050 in a *business-as-usual (BAU) forecast* scenario, and then quantifies the reduction impact that State regulations will have on the City of Pleasanton GHG emissions forecast and presents the results in an *adjusted forecast* scenario. The *adjusted scenario* incorporates the impact of State regulations which would reduce the City of Pleasanton's GHG emissions to provide a more accurate picture of future emissions growth and the responsibility of the City and community for GHG reductions once State regulations to reduce GHG emissions have been implemented.

Several indicator growth rates were developed and applied to the various emissions sectors to forecast emissions as shown in Table 16. The growth rates were applied to the most recent inventory year (2017) data to obtain projected activity data (e.g., energy use, waste production). Growth rates were developed from the Association of Bay Area Government's Plan Bay Area Projections 2040, EMFAC Modeling, OFFROAD2007 modeling, and California Department of Finance demographic estimates for the City of Pleasanton and Alameda County. Applicable State and federal regulatory requirements, including Corporate Average Fuel Economy standards, Advanced Clean Car Standards, Renewable Portfolio Standard, and Title 24 efficiencies were then incorporated to accurately reflect expected reductions from State programs.

Plan Bay Area Projections 2040 has demographic projections starting with 2010, and was the primary source for forecast projections.[51] In comparison with demographic data from the California Department of Finance E4 and E5 datasets[52] (which are updated year-to-year based on census data and jurisdictional data on population changes), however, Plan Bay Area Projections 2040 underestimates population and job growth in Pleasanton for 2015, 2020, and subsequent forecast years. For this reason, these forecast projections were adjusted using the calculated percent difference between the Plan Bay Area Projections 2040 and the Department of Finance data for 2015 and 2020. The result is a set of adjusted population and job projections through 2045 that reflect the greater increase in growth experienced by the City of Pleasanton between 2015 and 2020.

[51] Association of Bay Area Governments and Metropolitan Transportation Commission. 2018. Plan Bay Area Projections 2040. Available: <http://projections.planbayarea.org/>. Accessed: April 10, 2020.

[52] California Department of Finance. 2020. Available: <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/>. Accessed: April 16, 2020.

4.1 Business-as-Usual Forecast Scenario

The City of Pleasanton business-as-usual scenario forecast provides an estimate of how GHG emissions would change in the forecast years if consumption trends continue as in 2017, absent any new regulations which would reduce local emissions. Several indicator growth rates were developed from 2017 activity levels and applied to the various emissions sectors to project future year emissions. Table 20 contains a list of growth factors used to develop the business-as-usual scenario forecast, with a summary of the results in Table 19. The BAU growth factors were then multiplied by the population or service person growth rates to develop the BAU emissions forecast.

Table 20 Business-as-Usual Forecast Scenario Growth Factors

Sector	Activity Data
Emissions per capita (MT CO2e/capita)	7.7
Residential electricity per capita (kWh/capita)	2,276.0
Commercial electricity use per job (kWh/employment)	4,909.4
Direct Access electricity per capita (kWh/capita)	687.7
Residential gas per capita (therms/capita)	153.7
Commercial gas use per job (therms/job)	161.9
Solid Waste per service person (tons/SP)	0.7
ADC Waste per service person (tons/SP)	0.0026
Wastewater Process GHG per service population (MT CO2e/SP)	0.0062
CO2e per ton solid waste (MT CO2e/ton)	0.3
CO2e per ton ADC waste (MT CO2e/ton)	0.2
Water electricity per service person (kWh/SP)	127.7
Wastewater electricity per service person (kWh/SP)	22.8
Total VMT per service person (VMT/SP)	4,884.41

kWh: kilowatt hour; SP: service person (sum of population and employment) MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

Under the business-as-usual forecast scenario, Pleasanton GHG emissions are projected to continue increasing through 2050 as shown in Table 21. This increase is led primarily by a strong commercial and residential development trend. After the current General Plan horizon year of 2025, major increases in in emissions are largely attributed to the increased population and vehicular traffic from the greater Alameda County Area traveling into the city. By 2050, the City is expected to produce 169,689 MT CO_2e more emissions under the business-as-usual projections, an increase of 29 percent over 2017 emissions.

Table 21 Business-as-usual Forecast Scenario Summary by Sector by Target Year

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	18,206	18,496	19,005	20,116	21,229	22,404	23,644
Nonresidential Electricity	30,910	30,984	31,107	31,808	34,315	35,682	37,104	38,583
Direct Access Electricity	10,700	11,087	11,263	11,574	12,250	12,928	13,643	14,399
Residential Gas	62,647	64,913	65,945	67,762	71,719	75,689	79,879	84,301
Nonresidential Gas	56,181	56,315	56,539	57,813	62,369	64,855	67,440	70,128
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,785	1,803	1,849	1,974	2,069	2,169	2,275
Wastewater	1,190	1,214	1,227	1,258	1,343	1,408	1,476	1,548
On-Road Passenger Transportation	202,947	207,680	217,227	226,775	230,882	234,989	239,095	243,202
On-Road Commercial Transportation	126,668	126,797	131,035	135,273	140,210	145,147	150,084	155,021
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**600,774**	**622,079**	**646,644**	**676,918**	**703,457**	**730,555**	**758,242**
Emissions Per Capita	**7.67**	**7.55**	**7.70**	**7.79**	**7.70**	**7.59**	**7.47**	**7.34**

MT CO_2e: metric tons of carbon dioxide equivalent; T&D: Transmission and Distribution; Per capita based on population projections

Note: VMT data are provided by the MTC traffic demand model that are based on a variety of factors besides only projected demographic changes.

4.2 Adjusted Forecast Scenario

Adjustments Due to State Legislation

The adjusted scenario estimates future City of Pleasanton emissions under codified GHG reduction strategies currently being implemented at the State and federal level. The 2017 Scoping Plan Update identified several existing State programs and targets, or known commitments required by statute which can be assumed to achieve GHG reductions without City action, such as increased fuel efficiency standards of mobile vehicles. The following known commitments are factored into the adjusted scenario projection and a summary of the programs can be found in Table 22.

State programs will lead to a reduction of 233,683 MT CO_2e in GHG emissions by 2050 in Pleasanton. The increasing decarbonization of the electricity supply due to SB 100 and the Renewable Portfolio Standard (RPS) will lead to GHG emissions reductions in Pleasanton and avoid over 79,306 MT CO_2e by 2050. The transportation sector will experience the largest GHG reductions, with over 151,996 MT CO_2e reduced by 2050 through State and federal fuel efficiency and tailpipe emissions standards assuming no change to current legislation.

Table 22 Summary of Legislative Reductions Legislation

	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Senate Bill 100	6,613	17,806	29,657	44,135	59,251	75,708	79,306
Title 24	217	548	1,338	3,477	5,133	1,883	2,381
Transportation (Pavley, etc.)	22,973	67,430	103,931	126,264	139,416	146,985	151,996
Total	**29,803**	**85,784**	**134,925**	**173,875**	**203,800**	**224,576**	**233,683**

MT CO_2e: metric tons of carbon dioxide equivalent

Transportation Legislation

The CARB EMFAC2017 transportation modeling program incorporates legislative requirements and regulations including Advanced Clean Cars program (Low Emissions Vehicles III, Zero Emissions Vehicles program, etc.), and Phase 2 federal GHG Standards. Signed into law in 2002, AB 1493 (Pavley Standards) required vehicle manufactures to reduce GHG emissions from new passenger vehicles and light trucks from 2009 through 2016, with a target of 30 percent reductions by 2016, while simultaneously improving fuel efficiency and reducing motorists' costs.[53]

Prior to 2012, mobile emissions regulations were implemented on a case-by-case basis for GHG and criteria pollutant emissions separately. In January 2012, CARB approved a new emissions-control program (the Advanced Clean Cars program) combining the control of smog, soot causing pollutants, and GHG emissions into a single coordinated package of requirements for passenger cars and light trucks model years 2017 through 2025. The Advanced Clean Cars program coordinates the goals of the Low Emissions Vehicles, Zero Emissions Vehicles, and Clean Fuels Outlet programs. However, in 2019 the federal government issued a final action entitled the One National Program on Federal Preemption of State Fuel Economy Standards Rule, which finalized Part I of the Safer, Affordable, Fuel-Efficient

[53] California Air Resources Board. 2013.Clean Car Standards – Pavley, Assembly Bill 1493.

(SAFE) Vehicles Rule and stated that federal law preempts state and local tailpipe GHG emissions standards as well as zero emission vehicle mandates. While still in flux, under the SAFE Rule discussed above, fuel economy and GHG emission standards for new vehicles may not improve beyond model year 2020. According to CARB, the federal rollback proposal of the remaining Advanced Clean Cars Program standards would increase global warming emissions by 14 million metric tons per year by 2025.[54]

Reductions in GHG emissions from the above referenced standards were calculated using the CARB EMFAC2017 model for Alameda County. The EMFAC2017 model integrates the estimated reductions into the mobile source emissions portion of the model.[55]

Note: As of the time of this writing, the federal Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part 2 has been posted in the Federal Register but will not take effect until June 29, 2020. This new rule rolls back California fuel efficiency standards for on-road passenger vehicles, so that cars and trucks will now only achieve a 40.4 mpg industry average by 2026 compared to the 46.7 mpg projected requirement under the previous California Advanced Clean Car Program/federal Corporate Average Fuel Economy (CAFE) standards. No methodology currently exists for extracting or altering the on-road passenger vehicles fuel efficiency standard aspect of the Emissions Factors (EMFAC) model[56] used to calculate forecasted vehicle GHG emissions. In addition, the California Climate Change Scoping Plan does not yet address or provide guidance related to this pending change in fuel efficiency standards with regard to GHG emissions determination. Furthermore, California is currently challenging this new rule in the court system. Therefore, the Pleasanton adjusted forecasts have not been modified to reflect the new SAFE Rule Part 2.

Title 24

Although it was not originally intended to reduce GHG emissions, California Code of Regulations Title 24, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was adopted in 1978 in response to a legislative mandate to reduce California's energy consumption, which in turn reduces fossil fuel consumption and associated GHG emissions. The standards are updated triennially to allow consideration and possible incorporation of new energy-efficient technologies and methods. Starting in 2020, new residential developments will include on-site solar generation and near-zero net energy use. For projects implemented after January 1, 2020, the California Energy Commission estimates the 2019 standards will reduce consumption by seven percent for residential buildings and 30 percent for commercial buildings, relative to the 2016 standards. These percentage savings relate to heating, cooling, lighting, and water heating only and do not include other appliances, outdoor lighting not attached to buildings, plug loads, or other energy uses. The calculations and GHG emissions forecast assume all growth in the residential and commercial/industrial sectors is from new construction.

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54 California Air Resources Board. 2018. California moves to ensure vehicles meet existing state greenhouse gas emissions standards. Available: <https://ww2.arb.ca.gov/news/california-moves-ensure-vehicles-meet-existing-state-greenhouse-gas-emissions-standards-0>. Accessed: April 17, 2020.

55 Additional details are provided in the EMFAC2017 Technical Documentation, July 2018. Available: <https://www.arb.ca.gov/msei/downloads/emfac2017-volume-iii-technical-documentation.pdf>. Accessed: April 15, 2020. The Low Carbon Fuel Standard (LCFS) regulation is excluded from EMFAC2017 because most of the emissions benefits due to the LCFS come from the production cycle (upstream emissions) of the fuel rather than the combustion cycle (tailpipe). As a result, LCFS is assumed to not have a significant impact on CO_2 emissions from EMFAC's tailpipe emissions estimates.

56 The EMFAC model is developed and used by CARB to assess emissions from on-road vehicles including cars, trucks, and buses in California and to support CARB regulatory and planning efforts to meet Federal Highway Administration transportation planning requirements.

The 2017 Scoping Plan Update calls for the continuation of ongoing triennial updates to Title 24 which will yield regular increases in the mandatory energy and water savings for new construction. Future updates to Title 24 standards for residential and non-residential alterations past 2023 are not taken into consideration due to lack of data and certainty about the magnitude of energy savings realized with each subsequent update.

Renewables Portfolio Standard & Senate Bill 100

Established in 2002 under SB 1078, enhanced in 2015 by SB 350, and accelerated in 2018 under SB 100, the California RPS is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities, publicly owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 50 percent of total procurement by 2026 and 60 percent of total procurement by 2030. The RPS program further requires these entities to increase procurement from GHG-free sources to 100 percent of total procurement by 2045.

PG&E provides the majority of electricity in Pleasanton and is subject to RPS requirements. PG&E forecast emissions factors include reductions based on compliance with RPS requirements through 2045. In 2017, PG&E reported an emissions factor of 210 pounds CO_2e per MWh.

Direct access electricity accounted for 9.5 percent of total electricity usage in 2017, which is provided by third party electricity providers instead of traditional energy utilities. Emissions factors for the carbon intensity of direct access electricity was assumed to be equal to the State average, calculated to equal .203 MT CO_2e/MWh in 2017. RPS requirements were used to adjust this emissions factor for forecasted emissions through 2050.

Assembly Bill 939 & Assembly Bill 341

In 2011, AB 341 set the target of 75 percent recycling, composting, or source reduction of solid waste by 2020 calling for the California Department of Resources Recycling and Recovery (also known as CalRecycle) to take a Statewide approach to decreasing California's reliance on landfills. This target was an update to the former target of 50 percent waste diversion set by AB 939.

As actions under AB 341 are not assigned to specific local jurisdictions, actions beyond the projected waste diversion target of 5.9 pounds per person per day set under AB 939 for the City of Pleasanton will be quantified and credited to the City during the Climate Action Plan measure development process. As of 2017, Pleasanton is meeting both the 5.9 pounds per person per day and 9.5 pounds per job per day diversion targets set by CalRecycle under AB 341.

Senate Bill 1383

SB 1383 established a methane emissions reduction target for short-lived climate pollutants in various sectors of the economy, including waste. Specifically, SB 1383 establishes targets to achieve a 50 percent reduction in the level of the Statewide disposal of organic waste from the 2014 level by 2020 and a 75 percent reduction by 2025.[57] Additionally, SB 1383 requires a 20 percent reduction in "current" edible food disposal by 2025. Although SB 1383 has been signed into law, compliance at the jurisdiction-level has proven difficult. For example, Santa Clara County suggests the 75 percent reduction in organics is not likely achievable under the current structure; standardized bin colors are impractical; and the general requirement is too prescriptive.[58] As such, SB 1383 is not included as part of the adjusted forecast. Instead measures addressing compliance with SB 1383 will be addressed through newly identified GHG reduction measures included in the Climate Action Plan.

Adjusted Forecast Results

The adjusted scenario is based on the same information as the business-as-usual scenario but also includes the legislative actions and associated emissions reductions occurring at the State and federal levels. These actions include regulatory requirements to increase vehicle fuel efficiency or standards to reduce the carbon intensity of electricity. The difference between the emissions projected in the adjusted scenario and the GHG reduction targets established for each horizon year is the amount of GHG reductions which are the responsibility of Pleasanton. This "gap analysis" provides Pleasanton with the total GHG emissions reduction required as well as information on the emissions sectors and sources which have the most GHG reduction opportunities.

The electricity and water sectors all experience a strong downward trend, approaching near-zero in 2045 due to extremely stringent RPS from SB 100. Natural gas emissions are expected to continue an upward trajectory until 2050 due to strong population growth projections in the city. This trend is partially offset due to the increasingly stringent efficiency requirements for new homes in the upcoming Title 24 code cycles. Commercial growth will also lead commercial natural gas emissions on a similar trajectory. Transportation emissions are expected to decrease significantly in the next 10 to 15 years due to existing fuel efficiency requirements and fleet turnover rates. As most current regulations expire in 2025 or 2030, emissions standards will experience diminishing returns while VMT continues to increase, leading to lower rates of emissions reduction in the transportation sector.

A summary of Pleasanton's projected emissions by sector and year through 2050 can be found in Table 23 and Figure 5. Further details on the growth rates and emissions for each sector can be found in the corresponding discussion sections.

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[57] CalRecycle. 2019. Short-Lived Climate Pollutants (SLCP): Organic Waste Methane Emissions Reductions (General Information). Available: <https://www.calrecycle.ca.gov/climate/slcp>. Accessed: April 16, 2020.

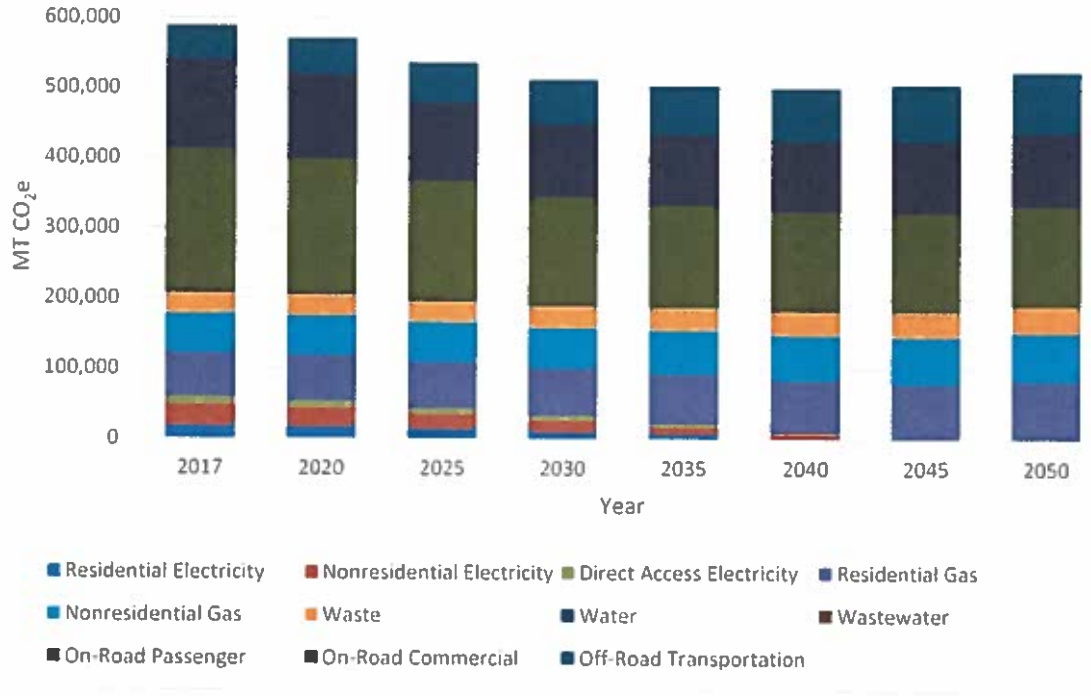
[58] Santa Clara County. 2018. SB 1383 Rulemaking Overview. Available: <https://www.sccgov.org/sites/rwr/rwrc/Documents/SB%201383%20PowerPoint.pdf>. Accessed: April 16, 2020.

Table 23 Adjusted Forecast Scenario Summary by Sector by Target Year

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	16,142	12,944	9,644	6,059	2,075	0	0
Nonresidential Electricity	30,910	27,657	22,175	16,785	11,249	4,955	0	0
Direct Access Electricity	10,700	9,931	8,145	6,335	4,213	1,836	0	0
Residential Gas	62,647	64,859	65,820	67,509	71,190	74,882	78,778	82,890
Nonresidential Gas	56,181	56,312	56,520	57,705	61,943	64,254	66,658	69,158
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,593	1,288	991	705	370	0	0
Wastewater	1,190	1,180	1,135	1,105	1,117	1,105	1,089	1,142
On-Road Passenger Transportation	202,947	190,764	168,825	153,381	143,608	140,208	140,267	141,752
On-Road Commercial Transportation	126,668	120,739	112,007	104,736	101,220	100,512	101,927	104,475
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**570,971**	**536,295**	**511,719**	**503,043**	**499,657**	**505,979**	**524,559**
Emissions Per Capita	**7.67**	**7.18**	**6.64**	**6.16**	**5.73**	**5.39**	**5.17**	**5.08**

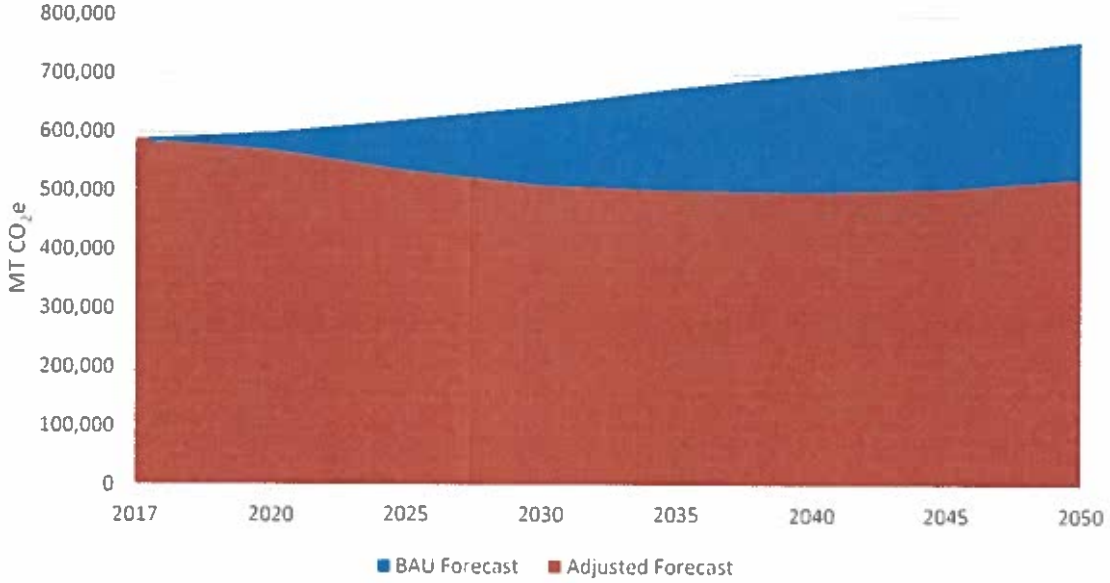
MT CO_2e: metric tons of carbon dioxide equivalent

Figure 5 Summary of Adjusted Forecast Scenario by Sector by Year



As shown in Figure 6, without legislative reductions, Pleasanton emissions would increase proportionally with population and economic growth. In reality, several existing legislative reductions would limit Pleasanton's emissions growth, causing projected emissions to decrease. This scenario is depicted by the Adjusted Forecast. The legislative reductions for each sector and scaling methods used to project emissions are discussed in detail below.

Figure 6 BAU and Adjusted Forecast Scenarios



Electricity Emissions

Between 2017 and 2045, electricity emissions from residential and nonresidential buildings in Pleasanton are assumed to decrease from 59,181 MT CO2e to 0 MT CO_2e in 2045 despite steady growth in Pleasanton's population and employment levels due to the adoption of SB 100 and the renewable portfolio standard. Electricity emissions are expected to stay at 0 MT CO2e in 2050 as well. It is currently not clear if PG&E's current plan to reach carbon neutral electricity by 2045 includes the use of offsets. Future work will need to be done if so to ensure no double counting occurs between PG&E and Pleasanton's efforts to reach carbon neutral emissions.

Emissions from future electricity use were forecasted by projecting anticipated growth in residential and commercial sectors and multiplying by expected electricity emission factors. Anticipated growth in the residential sector was projected as a function of population growth within Pleasanton while commercial sector electricity use was projected as a function of employment projections. Legislative adjustments included in the electricity sector forecast include RPS of 60 percent by 2030 and 100 percent GHG-free by 2045. Additionally, Title 24 building code efficiency increases for the 2019 code cycle were applied to all new growth within the city. The methodologies for the electricity sector which were forecasted in the adjusted scenario are summarized in Table 24 and Table 25.

Table 24 Electricity Sector Adjusted Forecast Scenario Methodology

Source Category	Forecasted Activity Data (Scaling Factor)	Emission Factor	Applied Legislative Reductions
Residential Electricity	Population growth in Pleasanton	Assumes an electricity mix of 44 percent, 60 percent, and 100 percent GHG-free by 2025, 2030, and 2045, respectively, for PG&E emission factors per RPS requirements.	Title 24 standards for new construction in 2019 (53 percent residential, 30 percent commercial), RPS requirements
Commercial & Industrial Electricity	Employment growth in Pleasanton		

RPS: Renewable Portfolio Standard; GHG: greenhouse gas; PG&E: Pacific Gas and Electric

Table 25 Electricity Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Residential Electricity							
Population	79,524	80,789	83,014	87,863	92,727	97,859	103,276
BAU total kWh	188,952,105	191,957,699	197,244,416	208,765,114	220,321,160	232,516,883	245,387,692
BAU per capita kWh	2,376	2,376	2,376	2,376	2,376	2,376	2,376
Adjusted kWh (Title 24)	187,772,909	189,185,538	191,670,295	197,085,023	202,516,365	208,248,355	214,297,635
Adjusted per capita kWh (Title 24)	2,361	2,342	2,309	2,243	2,184	2,128	2,075
Adjusted emissions factor (MT CO_2e/MWH)	0.08603	0.06882	0.05162	0.03441	0.01721	0	0
MT CO_2e	**16,142**	**12,944**	**9,644**	**6,059**	**2,075**	**0**	**0**
Nonresidential Electricity							
Employment	65,498	65,759	67,240	72,539	75,431	78,437	81,563
BAU total kWh	321,556,852	322,836,365	330,111,107	356,126,435	370,320,613	385,080,531	400,428,736
BAU per job kWh	4,909	4,909	4,909	4,909	4,909	4,909	4,909
Adjusted kWh (Title 24)	321,480,263	322,375,923	327,468,243	345,678,972	355,614,897	365,946,839	376,690,583
Adjusted per job kWh	4908	4902	4870	4765	4714	4665	4,618
Adjusted emissions factor (MT CO_2e/MWh)	0.08603	0.06882	0.05162	0.03441	0.01721	0	0
MT CO_2e	**27,657**	**22,175**	**16,785**	**11,249**	**4,955**	**0**	**0**
Direct Access Electricity							
Population	79,524	80,789	83,014	87,863	92,727	97,859	103,276
BAU total kWh	54,691,953	55,561,918	57,092,151	60,426,803	63,771,686	67,301,723	71,027,163
BAU per capita kWh	687	687	687	687	687	687	687
Adjusted kWh (Title 24)	54,498,754	55,107,730	56,178,894	58,513,150	60,854,568	63,325,594	65,933,402
Adjusted per capita kWh	685	682	677	656	631	647	638
Adjusted emissions factor (MT CO_2e/MWh)	0.1823	0.1483	0.1142	0.07614	0.03807	0	0
MT CO_2e	**9,931**	**8,145**	**6,335**	**4,213**	**1,836**	**0**	**0**

MT CO_2e: metric ton of carbon dioxide equivalent; kWh: kilowatt hour; MWh: megawatt hour; BAU: business-as-usual

Natural Gas Emissions

Emissions from projected natural gas use were forecast using a similar methodology to the electricity sector. Anticipated natural gas use was projected for the residential and commercial sectors separately using population change and employment increase as growth indicators respectively. These results were multiplied by a natural gas emission factor of 0.00531 MT CO_2e per therms of natural gas.[59] Unlike electricity, the natural gas emission factor is based on the quality of the gas and remains relatively constant over time. This analysis did not consider any shift to renewable gas which may become more common over time and the use of which may affect future natural gas emission factors. The methodologies and data used to calculate natural gas emissions over time are summarized in Table 26 and Table 27.

Legislative adjustments applied for the natural gas sector include efficiency increases from Title 24 building code updates for new construction after the 2019 code cycle begins. Specific efficiency increases for new buildings over the previous triennial cycle are discussed in Section 4.2.

Table 26 Natural Gas Adjusted Forecast Scenario Methodology

Source Category	Forecasted Activity Data (Scaling Factor)	Emission Factor	Applied Legislative Reductions
Residential Natural Gas	Population growth in Pleasanton	0.00531 MT CO_2e/therms	Title 24 standards for efficiency in new construction in 2019 (7 percent residential, 30 percent commercial over 2016 Title 24)
Commercial & District Natural Gas	Employment growth in Pleasanton		

MT CO_2e: metric ton of carbon dioxide equivalent

Table 27 Natural Gas Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Residential Gas							
BAU therms	12,223,478	12,417,912	12,759,914	13,505,198	14,252,769	15,041,721	15,874,345
Title 24 adjusted therms	12,213,402	12,394,226	12,712,289	13,405,403	14,100,644	14,834,369	15,608,709
Emissions factor (MT CO_2e/therms)	0.00531	0.00531	0.00531	0.00531	0.00531	0.00531	0.00531
MT CO_2e	**64,859**	**65,820**	**67,509**	**71,190**	**74,882**	**78,778**	**82,890**
Nonresidential Gas							
BAU therms	10,604,480	10,646,676	10,886,587	11,744,534	12,212,638	12,699,399	13,205,560
Title 24 adjusted therms	10,603,890	10,643,133	10,866,250	11,664,141	12,099,477	12,552,165	13,022,895
Emissions factor (MT CO_2e/therms)	0.00531	0.00531	0.00531	0.00531	0.00531	0.00531	0.00531
MT CO_2e	**56,312**	**56,520**	**57,705**	**61,943**	**64,254**	**66,658**	**69,158**

MT CO_2e: metric ton of carbon dioxide equivalent; BAU: business-as-usual

[59] The Climate Registry. 2019. Default Emissions Factors. Available: <https://www.theclimateregistry.org/wp-content/uploads/2019/05/The-Climate-Registry-2019-Default-Emission-Factor-Document.pdf>. Accessed: April 15, 2020

Waste Emissions

The forecast used a baseline emissions rate of 0.7201 tons of solid waste per service population and 0.0026 tons of ADC waste per service population along with projected growth in Pleasanton service population to establish the estimated tonnage of waste being disposed yearly through 2050. A 2017 solid waste emissions factor of 0.286 MT CO_2e and a 2017 ADC waste emissions factor of 0.246 MT CO_2e was used to project emissions consistent with service population growth. Emissions from the waste sector will likely be less than the projected totals due to decreasing rates of organic material in the waste stream and recent legislation such as SB 1383 discussed in previous sections. At this time, no mandate exists for individual cities and the waste reductions from these bills are incorporated into the Climate Action Plan through Pleasanton reduction measures to avoid double counting. A summary of the methodologies and data used to model waste emission over time are provided in Tables 28 and 29.

Table 28 Solid Waste Adjusted Forecast Scenario Methodology

Source Category	Forecasted Activity Data (Scaling Factor)	Emission Factor	Applied Legislative Reductions
Solid Waste	Service population growth	0.7201 tons solid waste per service person, 0.286 MT CO_2e/ton of solid waste	N/A
ADC Waste	Service population growth	0.0026 tons ADC waste per service person, 0.246 ADC MT CO_2e/ton ADC waste	N/A

MT CO_2e: metric ton of carbon dioxide equivalent; N/A: not applicable

Table 29 Waste Emissions Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Service Population	145,022	146,548	150,255	160,402	168,157	176,296	184,840
Ton Solid Waste per Service Population	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Ton ADC Waste per Service Population	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026
Total Tons Solid Waste	104,428	105,526	108,195	115,503	121,087	126,948	133,099
Solid Waste Factor (MT CO_2e/ton)	0.286	0.286	0.286	0.286	0.286	0.286	0.286
Total Tons ADC Waste	375	379	389	415	435	456	478
ADC Waste Factor (MT CO_2e/ton)	0.246	0.246	0.246	0.246	0.246	0.246	0.246
MT CO_2e	**29,963**	**30,279**	**31,044**	**33,141**	**34,743**	**36,425**	**38,190**

MT CO_2e: metric ton of carbon dioxide equivalent

Transportation Emissions

Transportation emissions forecasts were developed consistent with the inventory methodology, through the determination of on-road annual VMT multiplied by a year-specific weighted emissions factor for emissions per mile travelled. VMT forecasts for Pleasanton were obtained from the MTC VMT data portal.[60] The MTC Traffic Demand Model was used to model VMT through 2050. Emissions factors were established for each year through the use of the EMFAC2017 GHG module, which established VMT and total emissions for each vehicle type in Alameda County. These emissions factors were applied in each year to establish transportation emissions forecasts as shown in Tables 30 and 31.

Table 30 Transportation Adjusted Forecast Scenario Methodology

Source Category	Forecasted Scaling Factor	Emissions Factor	Applied Legislative Reductions
On-road Transportation	MTC VMT Modeling[1]	EMFAC2017 model analyzing light duty (LDA, LDT1, LDT2, MDV, MCY) and heavy duty (LHD, T6, T7, PTO, MH, SBUS, UBUS, OBUS, Motor Coach, All Other Buses) vehicles.	EMFAC emission factors account for legislative reductions from Advanced Clean Cars, Pavley Clean Car Standards, Tractor-Trailer Greenhouse Gas Regulation, and adopted fuel efficiency standards for medium- and heavy-duty vehicles.
Off-Road Transportation	OFFROAD2007 Model[2]	OFFROAD2007 Model	N/A

MT CO_2e: metric ton of carbon dioxide equivalent; VMT: vehicle miles traveled
[1] MTC VMT data portal incorporates data from the MTC's large-scale simulation model of daily travel behavior, used for its regional planning efforts and in Plan Bay Area. More information can be found on the MTC VMT Data Portal website at <http://capvmt.us-west-2.elasticbeanstalk.com/about>. Accessed: April 28, 2020.
[2] California Air Resources Board. 2007. OFFROAD2007. Available: <https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-archives>. Accessed: April 1, 2020.

[60] MTC. 2020. MTC VMT Model. Available: <http://capvmt.us-west-2.elasticbeanstalk.com/data>. Accessed: April 2020.

Table 31 Transportation Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Population	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Passenger VMT	615,314,349	643,601,315	671,888,281	684,056,020	696,223,759	708,391,498	720,559,237
Commercial VMT	92,829,236	95,931,969	99,034,703	102,649,181	106,263,658	109,878,136	113,492,613
Passenger EMFAC Emission Factor (g CO_2e/mile)	310	262	228	210	201	198	197
Commercial EMFAC Emission Factor (g CO_2e/mile)	1,301	1,168	1,058	986	946	928	921
Passenger MT CO_2e	190,764	168,825	153,381	143,608	140,208	140,267	141,752
Commercial MT CO_2e	120,739	112,007	104,736	101,220	100,512	101,927	104,475
Off-Road MT CO_2e	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total MT CO_2e	363,334	337,989	320,600	313,428	315,437	323,029	333,178

MT CO_2e: metric ton of carbon dioxide equivalent; VMT: vehicle miles traveled

Water and Wastewater Emissions

Due to the increased use of the water system attributed to increases in job and population growth in Pleasanton, service population was used as a scaling metric to determine water and wastewater service emissions through 2050. Projections for water used a baseline activity factor of 127.7 kWh per service population per year. This emissions factor was multiplied by service population growth through 2050 to find total kWh usage. The RPS for electricity generation was then applied to water emissions, as described in the Legislative Adjustment Section, to determine final MT CO_2e emissions as shown in Tables 32 and 33.

Table 32 Water and Wastewater Adjusted Forecast Scenario Methodology

Forecasted Activity Data (Scaling Factor)	Emissions Factor	Applied Legislative Reductions
Water, Service population (population and employment growth)	PG&E electricity emissions factors, 127.7 kWh per service population per year	Assumes an electricity mix of 44 percent, 60 percent, and 100 percent GHG-free by 2025, 2030, and 2045 respectively for PG&E emission factors per RPS requirements.
Wastewater, Service population (population and employment growth)	0.00618 MT CO_2e per service person per year for wastewater	N/A

MT CO_2e: metric ton of carbon dioxide equivalent; kWh: kilowatt hour; PG&E: Pacific Gas and Electric; N/A: not applicable

Table 33 Water Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Service Population	145,022	146,548	150,255	160,402	168,157	176,296	184,840
kwh/Service Person	127.7	127.7	127.7	127.7	127.7	127.7	127.7
Total kWh	18,520,765	18,715,598	19,188,995	20,484,966	21,475,331	22,514,795	23,605,848
RPS Electricity Factor (MTCO_2e/ MWh)	0.08603	0.06882	0.05162	0.03441	0.01721	0	0
MT CO_2e	**1,593**	**1,288**	**991**	**705**	**370**	**0**	**0**

MT CO2e: metric ton of carbon dioxide equivalent; kWh: kilowatt hour; RPS: renewable portfolio standard

As wastewater emissions are calculated from both methane as well as stationary and process nitrous oxide emissions, wastewater projections used an emissions factor of 0.00618 MT CO_2e per service population per year and a growth indicator of service population to determine future wastewater emissions, as shown in Table 34.

Table 34 Wastewater Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Service Population	145,022	146,548	150,255	160,402	168,157	176,296	184,840
Total kWh	3,301,265	3,335,993	3,420,375	3,651,377	3,827,907	4,013,188	4,207,664
MT CO_2e/ Service Population	0.00618	0.00618	0.00618	0.00618	0.00618	0.00618	0.00618
MT CO_2e	**1,180**	**1,135**	**1,105**	**1,117**	**1,105**	**1,089**	**1,142**

MT CO_2e: metric ton of carbon dioxide equivalent; kWh: kilowatt hour;

4.3 Future GHG Emissions Forecasts Results Summary

A BAU future GHG emissions forecast provides a forecast of how GHG emissions would change over time if consumption and activity trends were to continue as they did in 2017 and if growth were to occur as projected in the City 2005-2025 General Plan and Association of Bay Government future demographic forecasts. This does not include GHG emission reductions from any regulations that would reduce local emissions. BAU future GHG emissions forecast results for 2020, 2025, 2030, 2040, 2045, and 2050 are provided within Table 35.

Table 35 Summary of Pleasanton Business-as-Usual Future GHG Emissions Forecasts by Sector

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	18,206	18,496	19,005	20,116	21,229	22,404	23,644
Nonresidential Electricity	30,910	30,984	31,107	31,808	34,315	35,682	37,104	38,583
Direct Access Electricity	10,700	11,087	11,263	11,574	12,250	12,928	13,643	14,399
Residential Gas	62,647	64,913	65,945	67,762	71,719	75,689	79,879	84,301
Nonresidential Gas	56,181	56,315	56,539	57,813	62,369	64,855	67,440	70,128
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,785	1,803	1,849	1,974	2,069	2,169	2,275
Wastewater	1,190	1,214	1,227	1,258	1,343	1,408	1,476	1,548
On-Road Passenger Transportation	202,947	207,680	217,227	226,775	230,882	234,989	239,095	243,202
On-Road Commercial Transportation	126,668	126,797	131,035	135,273	140,210	145,147	150,084	155,021
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**600,774**	**622,079**	**646,644**	**676,918**	**703,457**	**730,555**	**758,242**
Emissions Per Capita	**7.67**	**7.55**	**7.70**	**7.79**	**7.70**	**7.59**	**7.47**	**7.34**

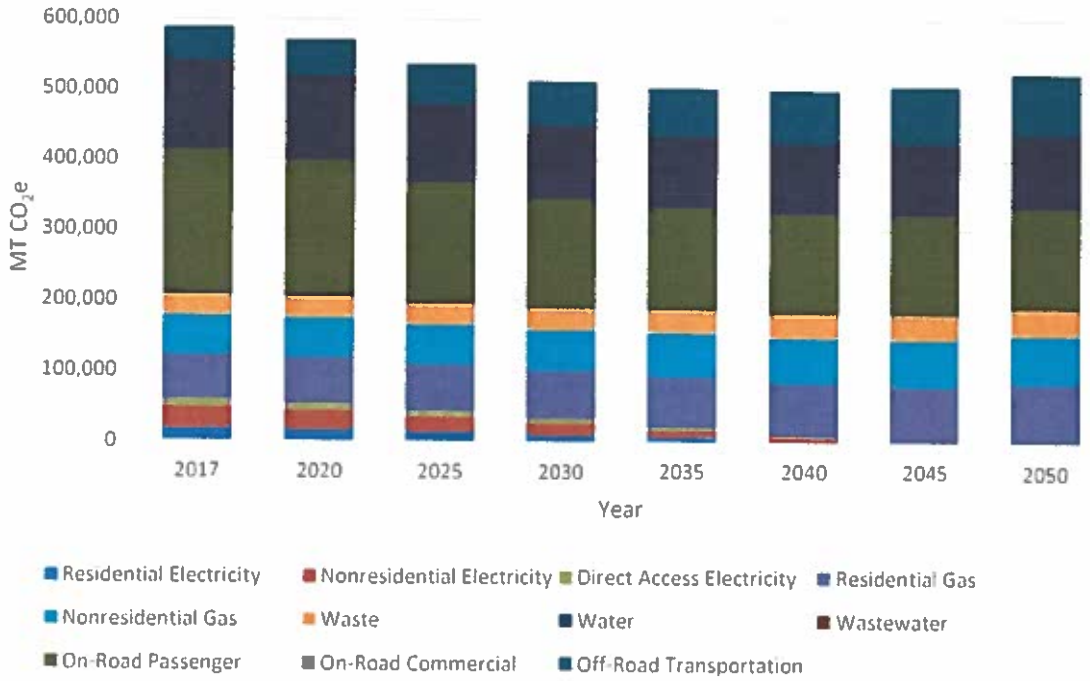
MT CO_2e: metric tons of carbon dioxide equivalent; T&D: Transmission and Distribution; Per capita based on population projections

Note: VMT data are provided by MTC traffic demand model and are based on a variety of factors besides projected demographic changes.

California has enacted multiple regulations that will reduce future local emissions. The impact of these regulations on GHG emissions have been incorporated into an *adjusted forecast*, which provides a more accurate picture of future emissions growth and the emission reduction the City and community will be responsible for after State regulations have been implemented. These State regulations include but are not limited to SB 100 (which sets a goal for reaching 100 percent electricity from renewable energy and zero-carbon sources by 2045) and California Air Resources Board (CARB) tailpipe emissions standards (Pavley Standards, Advanced Clean Cars Program).[61]

Calculating the difference between the adjusted forecast and the reduction targets set by the City determines the gap to be closed through City CAP policy implementation. Evaluating the percent change in the adjusted forecast from 2017 levels shows that Pleasanton's GHG emissions will decrease approximately 13 percent (76,834 metric tons) by 2030. Emissions will continue to decrease through 2040 but at a slower rate. Between 2030 and 2040 emissions will only decrease by an additional 2 percent, resulting in emissions being approximately 15 percent (88,896 metric tons) below 2017 levels in 2040. This is due to expected reductions from current legislation reaching the end of their effective lifetimes around 2030, particularly Title 24 and California's vehicle efficiency standards. Emissions will then begin to increase again after 2040, with expected population and job growth beginning to outpace the GHG emissions reductions resulting from the SB 100 zero-carbon electricity goal in 2045. This will lead to emissions being approximately 11 percent (63,994 metric tons) lower than 2017 levels in 2050. Future State regulation may help offset this increase, but no long-term legislation has been adopted at the time of this writing. The summary results of the adjusted future GHG emissions forecast are shown in Figure 7 and provided within Table 36.

Figure 7 Pleasanton Adjusted Future GHG Emissions Forecasts by Sector



61 Refer to Section 4.2 of this Technical Appendix for the full list of State and federal legislation that was taken into account within the forecasting model.

Table 36 Summary of Pleasanton Adjusted Future GHG Emissions Forecasts by Sector

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	16,142	12,944	9,644	6,059	2,075	0	0
Nonresidential Electricity	30,910	27,657	22,175	16,785	11,249	4,955	0	0
Direct Access Electricity	10,700	9,931	8,145	6,335	4,213	1,836	0	0
Residential Gas	62,647	64,859	65,820	67,509	71,190	74,882	78,778	82,890
Nonresidential Gas	56,181	56,312	56,520	57,705	61,943	64,254	66,658	69,158
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,593	1,288	991	705	370	0	0
Waste-water	1,190	1,180	1,135	1,105	1,117	1,105	1,089	1,142
On-Road Passenger Transportation	202,947	190,764	168,825	153,381	143,608	140,208	140,267	141,752
On-Road Commercial Transportation	126,668	120,739	112,007	104,736	101,220	100,512	101,927	104,475
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**570,971**	**536,295**	**511,719**	**503,043**	**499,657**	**505,979**	**524,559**
Emissions Per Capita	**7.67**	**7.18**	**6.64**	**6.16**	**5.73**	**5.39**	**5.17**	**5.08**

MT CO_2e: metric tons of carbon dioxide equivalent; T&D: Transmission and Distribution; Per capita based on population projections

5 GHG Emissions Reduction Targets

5.1 Provisional GHG Emissions Targets – 2030, 2045, 2050

California currently has established goals for reducing GHG emissions by 40 percent compared to 1990 levels by 2030 (SB 32), achieving carbon neutrality by 2045 (EO B-55-18), and the previous executive order (S-03-05) that called for an 80 percent reduction from 1990 levels by 2050 . It is recommended that Pleasanton establish GHG emissions targets for the years 2025 (interim target), 2030 (SB 32 target year), 2040 (interim target), and 2045 (EO B-55-18 target year) - or if desired 2050 (EO S-3-05 target year) - to show compliance with these multiple-year State goals.

The City of Pleasanton has the ability to set GHG emissions reduction targets that suit its needs. However, to be considered a "Qualified GHG Reduction Plan" that can be used for California Environmental Quality Act (CEQA) GHG emissions analyses streamlining purposes pursuant to CEQA Guidelines Section 15183.8, the City should adopt a GHG emissions target that is at least as stringent as the State targets described above. Specifically, the City should target emission reductions of at least 40 percent below 1990 levels by 2030 and adopt a longer-term target of carbon neutrality by 2045 consistent with EO B-55-18 or 80 percent below 1990 levels by 2050 consistent with S-03-05. Currently both EOs remain in place; however, it appears that EO B-55-18 will likely be codified. The carbon neutrality target has been adopted by many other California cities in their CAP updates, and some jurisdictions, such as the Sacramento Metropolitan Air Management District, have adopted carbon neutrality as a CEQA GHG emissions significance threshold.[62]

The following discussion outlines the minimum GHG reduction targets required for CEQA GHG emissions analyses streamlining. However, Pleasanton can choose to adopt other GHG emissions reduction pathways that exceed these reductions and still maintain status as a Qualified GHG Reduction Plan under CEQA. Any target pathway that reduces less emissions by 2030 would not be considered consistent with the State goals. While more aggressive targets will initially require additional effort, a more stringent short-term goal (2030) may make it easier to reach longer-term goals like carbon neutrality.

There are several different methodologies for calculating these minimum GHG emissions reductions. The City could choose to adopt mass emission, per capita, or per service person targets. The Pleasanton 2012 CAP includes only mass emissions targets. Mass emission targets describe emissions in terms of total MT CO_2e without any adjustment for population growth. The most recent State Climate Change Scoping Plan (2017) includes guidance that details the methodology and benefits of developing per capita and per service person targets. Generally, per capita targets are suggested unless circumstances such as a skewed jobs-to-residents ratio is identified. The key benefit of a per capita target is that it corrects for population growth. This means that the target does not become more difficult to reach if the City grows faster than projected. Per capita emissions targets are developed by dividing the emissions in each target year by the forecasted population. Emission targets in both mass emissions and per capita emissions are discussed below.

[62] Sacramento Metropolitan Air Management District. 2020. Guide to Air Quality Assessment in Sacramento County. Available: <http://www.airquality.org/businesses/ceqa-land-use-planning/ceqa-guidance-tools>. Accessed: May 31, 2020.

Mass Emissions Pathways

The first proposed methodology for setting GHG emissions reduction target pathways is based on a total GHG emissions basis (i.e., mass emissions). This is the traditional methodology for establishing emissions targets as a part of CAP and was employed by the City for development of the 2020 target. The two pathways that meet CEQA Guidelines include:

1. **The SB 32/B-55-18 Mass Emissions Pathway.** This target pathway meets the minimum requirements for CEQA GHG emissions analyses streamlining. The pathway sets a 40 percent reduction from 1990 levels by 2030 and then carbon neutrality by 2045 consistent with EO B-55-18.
2. **The SB 32/S-03-05 Mass Emissions Pathway**. This target pathway meets the minimum requirements for SB 32. The pathway sets a 40 percent reduction from 1990 levels by 2030 but then adopts an 80 percent reduction by 2050 consistent with EO S-03-05.

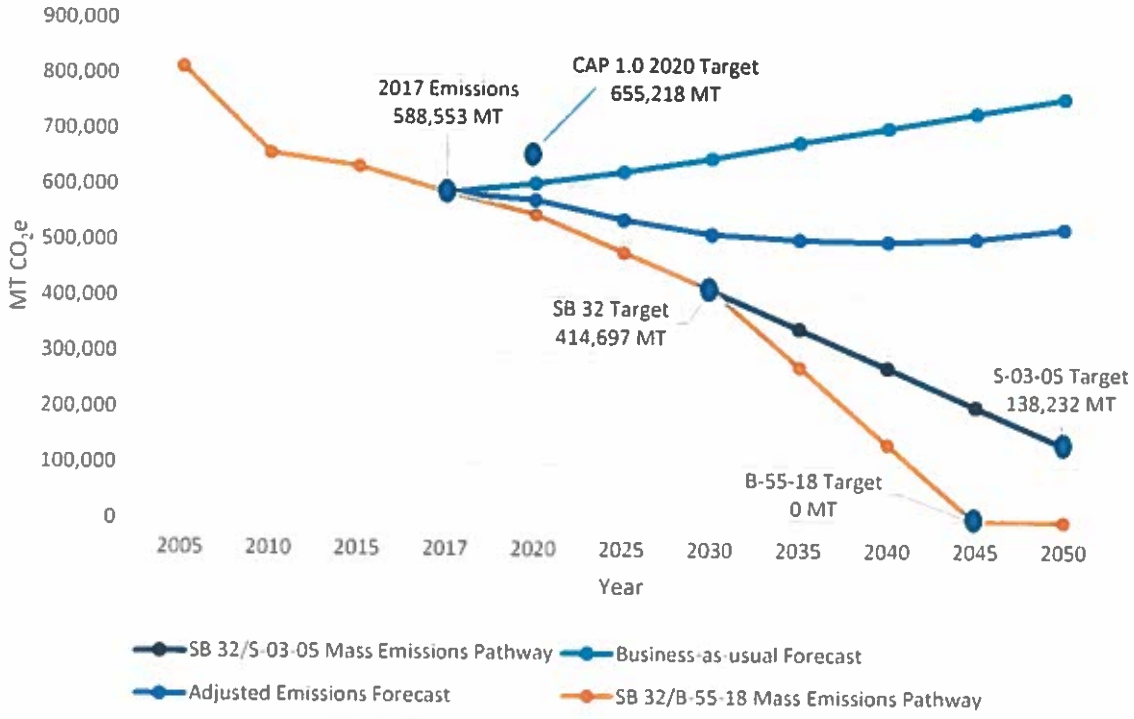
Table 37 provides GHG emissions targets for 2025, 2030, 2035, 2040, 2045, and 2050 for Pleasanton based on each of the SB 32/S-03-05 and SB 32/B-55-18 GHG mass emissions reduction target pathways. Figure 8 details the reduction necessary to achieve the mass emission targets in relation to the baseline inventory, business-as-usual forecast, and adjusted forecast. Forecasted emissions for 2020 are based off the 2017 inventory year, which already exceeds the original AB 32 target.

Table 37 Summary of Pleasanton Future GHG Emissions Forecasts by Mass Reduction Target Pathway

Emissions Forecast	2017 (MT CO2e)	2020 (MT CO2e)	2025 (MT CO2e)	2030 (MT CO2e)	2035 (MT CO2e)	2040 (MT CO2e)	2045 (MT CO2e)	2050 (MT CO2e)
Business-as-Usual Emissions Forecast	588,553	600,774	622,079	646,644	676,918	703,457	730,555	758,242
Adjusted Emissions Forecast	588,553	570,971	536,295	511,719	503,043	499,657	505,979	524,559
2045 SB 32 Mass Emissions Pathway	588,553	548,433	481,565	414,697	276,465	138,232	0	0
2050 SB 32 Mass Emissions Pathway	588,553	548,433	481,565	414,697	345,581	276,465	207,348	138,232

MT CO_2e: metric tons of carbon dioxide equivalent

Figure 8 Minimum Required Reduction Pathways for CEQA Streamlining (Mass Emissions)



Per Capita Emissions Pathways

Each of the above mass emission targets can also be expressed on a per capita basis (the second proposed methodology for setting GHG emissions reduction target pathways). Per capita targets are derived by dividing the mass emissions by the forecasted population in each target year. The benefit of per capita targets is primarily the ability to control for population growth over time. By adopting a per capita target, Pleasanton can continue to grow without sacrificing the ability to reach its GHG reduction goals.

1. **The SB 32/B-55-18 Per Capita Pathway.** This pathway translates the emissions targets referenced above under the mass emissions pathway into a per capita target by dividing each target year by the forecasted population. This pathway achieves a 40 percent reduction below 1990 levels by 2030 and then carbon neutrality by 2045.
2. **The SB 32/S-03-05 Per Capita Pathway.** This pathway translates the emissions targets referenced above under the mass emissions pathway into a per capita target by dividing each target year by the forecasted population. This pathway achieves a 40 percent reduction below 1990 levels by 2030 and then an 80 percent reduction below 1990 levels by 2050.

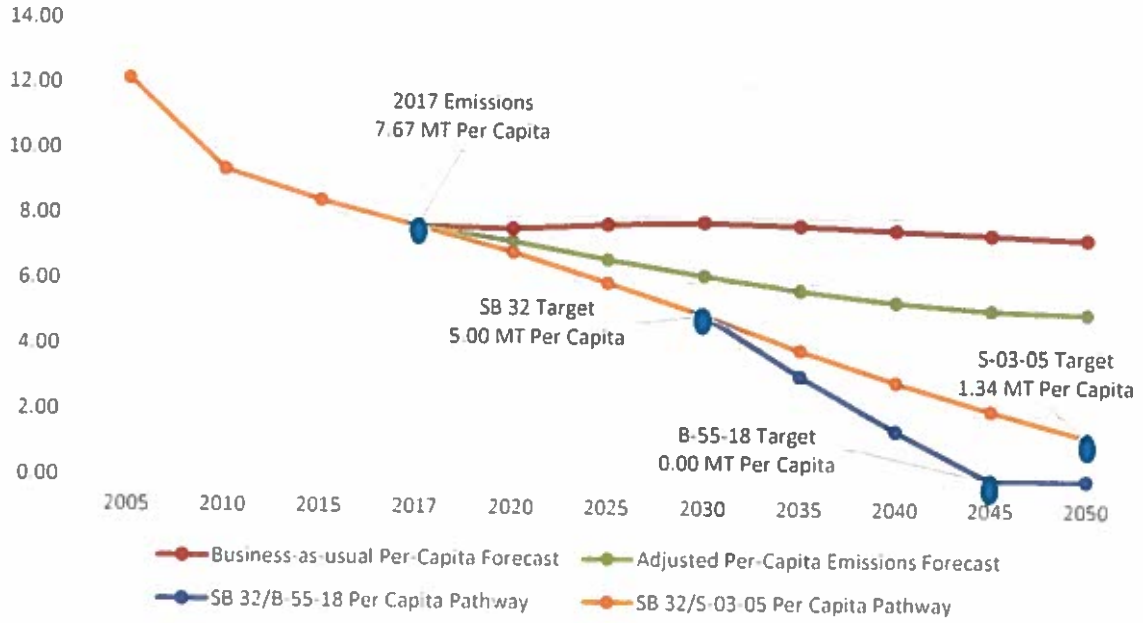
Table 38 provides per capita GHG emissions targets for 2025, 2030, 2035, 2040, 2045, and 2050 for Pleasanton based on the SB 32/S-03-05 and SB 32/B-55-18 GHG mass emissions reduction target pathways. Figure 9 details the GHG emission reduction necessary to achieve the per capita emission targets, in relation to the baseline inventory, business-as-usual forecast, and adjusted forecast.

Table 38 Summary of Pleasanton Forecasts by Per Capita Efficiency Reduction Target Pathway

Emissions Forecast	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Business-as-Usual Per Capita Emissions Forecast	7.67	7.55	7.70	7.79	7.70	7.59	7.47	7.34
Adjusted Per Capita Emissions Forecast	7.67	7.18	6.64	6.16	5.73	5.39	5.17	5.08
SB 32/ B-55-18 Per Capita Pathway	7.67	6.90	5.96	5.00	3.15	1.49	0.00	0.00
SB 32/S-03-05 Per Capita Pathway	7.67	6.90	5.96	5.00	3.93	2.98	2.12	1.34

MT CO_2e: metric tons of carbon dioxide equivalent

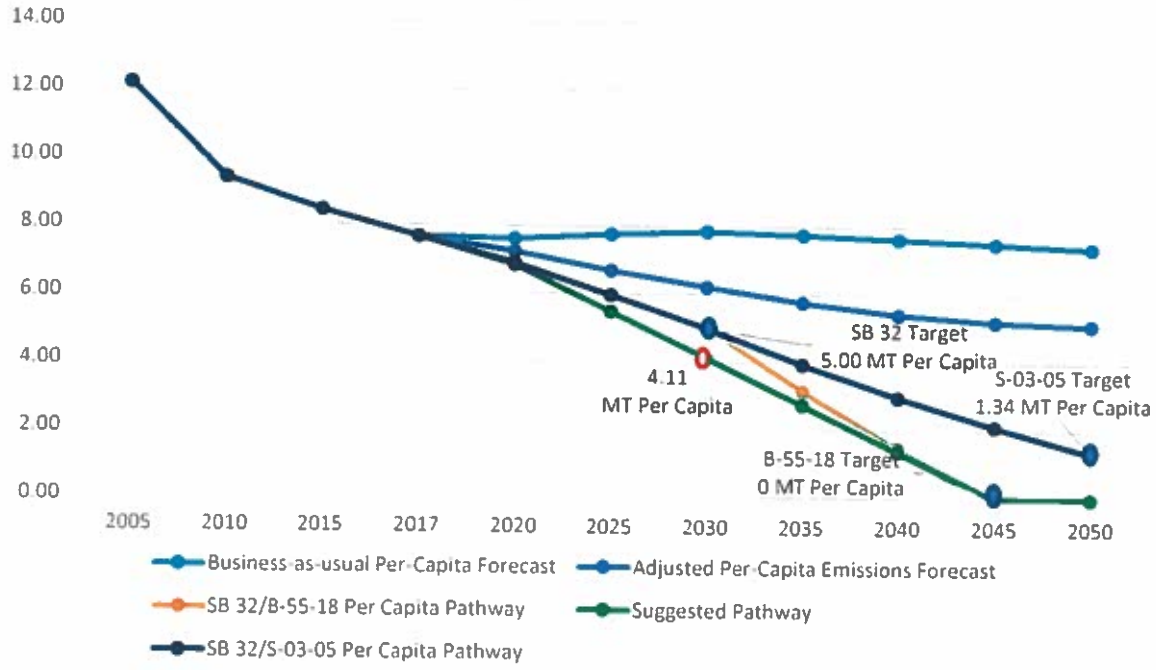
Figure 9 Minimum Required Reduction Pathways for CEQA Streamlining (Per Capita Emissions)



Suggested GHG Emissions Reduction Pathway

Pleasanton could adopt any of the GHG emissions target reduction targets discussed above for the CAP Update, as all of these pathways would comply with State emissions reduction goals and requirements for a CEQA Qualified GHG Reduction Strategy. However, the City could also choose to adopt a 2030 target on a straight-line trajectory from 2020 to 2045 that would provide a more stringent GHG reduction target than what has been established for SB32, as detailed in Figure 10. This target may be more ambitious in the short term but could spur the upfront actions required to reach the longer-term State goal of carbon neutrality. The adoption of a per capita target is also suggested, due to the increased flexibility associated with controlling for population growth. Figure 10 shows the suggested GHG emissions reduction pathways compared to pathways that are minimally compliant with CEQA.

Figure 10 Suggested GHG Emissions Reduction Pathway Compared to Minimum CEQA-compliant Pathways (Per Capita Emissions)



Although this suggested pathway is more stringent than State goals, it offers the following key benefits:

- The per capita target is more flexible and allows for population growth over time;
- More stringent short-term targets could spur the adoption of significant actions and smooth the transition to carbon neutrality in the longer term; and
- A target of carbon neutrality by 2045 will ensure CAP targets are consistent with longer-term future State targets.

5.2 Meeting the GHG Emissions Targets

The GHG emissions targets identified above will be achieved through implementation of local GHG emissions reduction measures that are to be identified within the Pleasanton CAP Update. Local measures will be identified through a comprehensive assessment of existing local and regional policies, programs, and actions and by assessing gaps and identifying additional opportunities. Additional measures will be developed from best practices worldwide and of other similar and neighboring jurisdictions, as well as those recommended by organizations and agencies, such as the California Air Pollution Control Officers Association (CAPCOA), Attorney General's office, and Air Resources Board. Measures will be vetted by City staff and the community and will be quantified to identify their overall contribution to meeting the Pleasanton GHG reduction targets. Although measures in the Pleasanton CAP Update will continue to achieve emissions reductions after 2030 and establish a trajectory for reaching longer-term goals, another phase of climate action planning and the realization of additional technological advances and State measures will be needed to meet the longer-term targets. This next phase will build on CAP Update measures, informed by monitoring and adaptive management, and take advantage of new technologies and climate protection science that will be available in the future.